

Tropical food chains

Governance regimes for quality management



edited by:
Ruerd Ruben
Martinus van Boekel
Aad van Tilburg
Jacques Trienekens

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Preface

The organization and performance of tropical food chains, rewarding the producers at one end of the chain, and satisfying the consumers at the other end of the chain, is a major demand in sustainable development and is based on the paradigm of the three P's: People, Planet, Profit. I am very pleased with this book that covers the topic in relation to development cooperation. The chain structure is captured in studies concerning channel choice and governance, while chain performance is studied by analyzing quality performance and value added distribution throughout the chain. Considering why I think that this is important, I would like to bring forward the following aspects:

- From a societal point of view, it seems to me that well-structured and well-organized tropical food chains are beneficial first of all to producers in developing countries. If the market outlets for their products are well established, this will ensure additional income and further development of especially small scale farmers in developing countries. But also consumers in developed countries may profit because, if the chain performs well, attractive high-quality products will be delivered to consumers that are willing and able to pay a good price.
- Insight in how food chains and networks operate and perform is of importance in our time of globalization. Although not everyone may be in favour of globalization, it is a fact of life and the studies reported in this book analyze factors influencing how chains and networks have developed and are developing and this knowledge can be used to improve similar situations wherever needed.
- The problem that is addressed in this book is clearly multidimensional. The reader will discover that researchers coming from both social and technological sciences have been working on this topic, more specifically, development economics, sociology, management studies, marketing and food technology.

The motto of Wageningen University is *For quality of life*. This includes problems related to food security, food safety and livelihoods. These problems need to be addressed in a multidisciplinary and interdisciplinary way. Societal and technological problems are interwoven and it is therefore logical to combine social and natural sciences to solve societal problems. However, this is easily said but not so easily done. This book describes the successful result of an attempt to actually explore the possibilities of and difficulties in interdisciplinary research. Based on an initial grant from the funding agency WOTRO (Dutch funding agency for research related to the tropics) critical mass has been developed to realize this highly important integration of social and natural sciences in cooperation with projects from other funds. This book is the evidence that it is really possible to come to a scientifically sound integration of social and natural science. Besides that, there will be a number of PhD theses defended at Wageningen University that demonstrate the required scientific depth for the various aspects that are discussed in this book.

I sincerely hope that this book will serve as a nucleus for further research in this area. It offers both a theoretical framework and empirical studies upon which further research can be built. The book editors, the PhD students and the postdocs that contributed to this project are to be congratulated for their achievements.

February 2007,

Prof.dr. M.J. Kropff
Rector Magnificus of Wageningen University

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Linking market integration, supply chain governance, quality and value added in tropical food chains

Ruerd Ruben, Aad van Tilburg, Jacques Trienekens and Martinus van Boekel

Abstract

This chapter provides a comprehensive theoretical framework that focuses on the linkages between four key dimensions of supply chain organisation of perishable tropical food products. These dimensions are channel choice, governance regime, quality performance and value added distribution. The first two represent the *structure* of the supply chain, whereas the last two dimensions focus on supply chain *performance*. Channel choice deals with how to reach the final customer in the most optimal way. Governance regime reflects how to reduce transaction costs and enhance cooperation and trust amongst supply chain partners. Quality performance deals with how to manage food technology processes such that quality levels can be enhanced and variability in quality can be exploited. Finally, value added distribution treats the way in which an acceptable remuneration can be guaranteed to all supply chain partners according to their contributions and efforts. Main attention is given to the impact of different governance regimes and management practices for the establishment of appropriate incentive structures that enable supply chain partners to invest in resources and devote concerted efforts to quality improvement. Reduction of transaction costs, creation of networks based on trust (social capital) and trade-offs between direct and future gains might offer substantial contributions to effective quality management and enforcement. Transparency in contract specifications or bargaining procedures may contribute to a better distribution of the value added resulting from improved quality performance.

1. Introduction

This book provides a comprehensive theoretical framework and a collection of empirical case studies that focus on the linkages between four key dimensions of the supply chain organisation of vulnerable (perishable) tropical food products, namely:

1. Channel choice: how to reach the final customer in an optimal way?
2. Governance regime: how to reduce transaction costs and enhance cooperation and trust amongst supply chain partners?
3. Quality performance: how to manage food technology processes in order to enhance quality levels and/or to exploit quality variability?
4. Value added distribution: how to guarantee an acceptable remuneration to supply chain partners according to their contributions and efforts?

The first two of these dimensions represent the *structure* of the supply chain, whereas the last two dimensions focus on supply chain *performance*. Effective interactions between both aspects are of critical importance to guarantee dynamic adjustments of supply chain organisation to changing market and institutional conditions.

The approach followed in the different contributions in this book is based on an integrated and interdisciplinary framework that is outlined in this introductory chapter. Key attention is given to the linkages between supply chain structure, its (technical and economic) performance, and the impact of different governance regimes and management practices for the establishment of an appropriate incentive structure that enables supply chain partners to invest resources and devote concerted efforts to quality improvement and upgrading (Hueth *et al.*, 1999). Reduction of transaction costs, creation of trust networks (social capital) and sharing of risk might offer substantial options for overcoming trade-offs between chain agents (Williamson, 1985) and could either be helpful to enhance techno-managerial solutions for improving quality and value added, and/or to promote socio-economic reforms for supply chain agency coordination or bargaining.

Most attention is given to supply chains of vulnerable (mostly perishable) tropical food products (fruit, vegetables, fish, dairy and meat) that are highly heterogeneous in terms of production and supply and are delivered to (inter-)national market outlets through complex systems of brokerage and interlinked commodity exchange regimes. Common features that are characteristic for agro-food supply chains of tropical food products (Lambert and Cooper, 2000) and justify a specific treatment refer to:

- large irregularities in supply (production subject to weather and climate);
- high variability in quality attributes;
- scattered production by a large number of smallholder producers;
- thin local markets (limited number of traders; local oligopoly);
- high transaction costs (long distance between producers and consumers);
- deficient public regulation and limited collective action.

These characteristics together imply that traded volumes, delivery frequency and product quality attributes are strongly dependent on supply chain coordination, while at the same time organisational adjustment mechanisms can be used to call upon an endogenous process of supply chain integration and optimisation. These critical interfaces between the before-mentioned four dimensions of supply chain organisation will be further elaborated in this introductory chapter. Therefore, an interaction matrix is presented (Table 1) reflecting ‘meeting points’ of technical, institutional and socio-economic aspects of supply chain organisation and indicating feasible instruments or strategies that could be helpful to overcome possible trade-offs and to enhance potential synergies.

The subsequent discussion in this chapter is structured around the four dimensions of supply chain organisation and closely follows the interfaces illustrated in the interaction matrix. This implies that main attention is given to the strategic

Linking market integration, supply chain governance, quality and value added

Table 1. Critical interfaces between supply chain dimensions.

Having effect on:	Performance is influenced by:			
	Channel choice	Governance regime	Quality performance	Value added distribution
Channel choice	Transaction costs and risk management		Standards, labels and branding	Sorting & delivery contracts.
Governance regime	Vertical integration & trust relationships		Quality enforcement; monitoring, control & sanctions	Market differentiation & collective action
Quality performance	Subcontracting or outsourcing; integral quality control	Quality assurance & certification		Economies of scale & scope; location choice
Value added distribution	Market competition & dedicated suppliers.	Bargaining opportunities & power relations	Co-innovation & co-operation	

opportunities for dovetailing technical, economic and institutional approaches to supply chain optimisation that essentially rely on dovetailing key areas where mutual interactions take place. This interdisciplinary approach to supply chain interfaces enables us to focus on the critical interactions between different agents and to identify prospective areas for coordinated action. Supply chain optimisation thus becomes a challenge that needs to be addressed jointly by the partners while preferably focussing on opportunities for addressing key constraints. This does not imply, however, that synergies can be always reached, since trade-offs (e.g. between subcontracting and bargaining, or between outsourcing and quality control) are likely to emerge. In those cases, public policies may be required to overcome the remaining constraints.

2. Channel choice and channel decisions

2.1. Introduction: channel decisions

Supply chains or marketing channels represent a process in which a product or service is made available for use or final consumption. Channel strategy or channel decisions require a broad view about how channel actors bridge the gap between supply and—sometimes distant—demand. Channel decisions regarding ‘long’ channels are usually

taken by a channel leader or a lead firm with the aim to serve the customers better than in case of producing for anonymous (spot) markets. A channel decision process implies that planning is needed to select the (mix of) proper channel(s) that will give an optimal result for the total channel or its leader. Such a leading role may be jointly taken by all channel participants or individually by the channel leader.

Suppliers need to take a number of decisions when they produce for their customers (e.g. Van der Laan, 1997). Main categories of (interdependent) decisions regard the type of product, service or assortment to offer (*What to offer?*), the channel decision (*How to reach the final customer in an optimal way?*), the value decision (*Benefits of the channel need to be larger than costs*) and the communication decision (*How to inform all stakeholders in the chain about strengths and weaknesses of the offer?*). Channel actors are assumed to fulfill the needs of all their stakeholders, including the final consumer, taking their social responsibility into account. The focus in this section is on the channel decision and its implications for governance regimes (Section 2.2), quality performance (Section 2.3) and value added distribution.(Section 2.4).

Channel decisions by a supplier or channel leader usually regard the following key elements (e.g. Lambert and Cooper, 2000; Stern *et al.*, 1996):

What is the customer base?

- a. Products or services need to be made available for supply and the potential of selected target market(s) or market segments need to be determined.
- b. The required service levels demanded by customers in these markets or market segments, e.g. in terms of quality level, package size and delivery time need to be assessed.

Multi-channel integration?

- c. The number of different options to reach the customers (e.g. a single channel or a multi-channel approach) and their relative importance.

How many stages in the (each) channel?

- d. The number of main stages in each multi-level channel, e.g.: the assembly stage, the processing stage and the distribution stage.
- e. The number of sub-stages, e.g. sub-assembly levels and large-scale assemblers, large scale wholesalers and sub-wholesalers.
- f. The channel decision needs to take into account opportunities and threats for disintermediation and reintermediation in a channel (e.g. Circu and Kauffman, 2000; Dijkstra *et al.*, 2001).

What type of governance system and how to measure performance (including the distribution of value-added)?

- g. The (combination of) governance system(s) in each channel, e.g. spot market(s), contracts, ownership or network (e.g. Williamson, 1999).
- h. The logistics used to enhance customer satisfaction, or to reduce costs.
- i. Channel performance measurement and feedback in terms of the triple E: *effectiveness* (is the channel providing what it aims to provide?), *efficiency* in resource use (e.g. cost effectiveness) and *profitability* (e.g. return on investments), and *equity* (e.g. value-added distribution) considerations. Channel

performance measurement and feedback is an input for the strategic process in which channel members or the channel leader assess the strategic fit between channel objectives, its resources and the changing channel environment.

2.2. Channel choice and governance regimes

The institutional organisation of supply chain channels is likely to be based on the choice of appropriate governance regimes that permit to reduce transaction costs of exchange and eventually consider options for vertical chain integration (Williamson, 1985). Several 'prototypes' of supply chains or marketing channels are distinguished in the literature (e.g. Gereffi, 2003). Stern *et al.* (1996) consider 4 major types:

1. Conventional marketing channels (CMC).
'Consist of isolated and autonomous units or stages, each of which performs a traditionally defined set of marketing functions. Co-ordination among channel members is primarily achieved through bargaining and negotiation at spot markets.'
2. Vertical marketing channels or systems (VMS).
'Consist of networks designed to achieve technological, managerial and promotional economies through the integration, co-ordination, and synchronisation of marketing flows from points of production to points of ultimate use.' Main types of vertical marketing systems are:
 - voluntary co-operation or co-ordination by joint planning;
 - contractual co-operation;
 - corporate ownership.
3. Networks of agents based on trust (e.g. relatives, or people belonging to the same ethnic group).
4. Hybrid forms of governance.

Gereffi (2003) suggests that 'market-based relationships among individual firms' and 'vertically integrated firms' (or hierarchies) represent opposite ends of a continuum of explicit coordination in which 'networks' comprise an intermediate mode of value chain governance.

2.2.1. Transaction costs and risk

In both agriculture and food production and marketing, we distinguish perishables (e.g. fruits and vegetables, roots and tubers, fish) versus 'non'-perishables which can be stored for quite a long time when properly treated in terms of moisture content and storage conditions (e.g. cereals, beans). The more perishable a product is, and the more uncertain or risky the environment of the supply chain is, the more 'central' governance is needed to guarantee that channel objectives of all stakeholders are attained. Reduction of transaction costs and risk can be perceived through different supply chain configurations.

Janssen and Van Tilburg (1997) hypothesised how a set of supply chain characteristics (e.g. seasonality control, level of trade arbitrage, level of transaction costs, value-added distribution, and degree of vertical coordination) can be associated to a particular stage of economic development of a region (i.e. primitive, emerging, intermediate, industrialised or advanced stage). Improvements in marketing systems depend very much on the related institutional, economic, political and natural environment, as well as on product and location-specific conditions.

Within the same supply channel a conglomerate of several modes of governance may coexist (e.g. Ponte and Gibbon, 2005). The optimal governance structure of the channel will then depend on both internal (e.g. type of products, type of processes, history) and external (e.g. types of demand, competition) opportunities and limitations or threats. Such mixed configurations are well-known to reduce transaction costs and risk for categories of supply chain agents.

2.2.2. Vertical integration

Wierenga (1997), following Johnston and Lawrence (1988), defined an Agrifood Value-Adding Partnership (AVAP) as a set of interdependent companies that work closely together to manage the flow of goods and services along the value-added chain of agricultural and food products. The aim is to realise superior customer value at the lowest possible costs. Nowadays, also other (extrinsic) aspects representing social responsible behaviour of channel stakeholders are taken into account.

Supply chains of perishable tropical products tend to be ‘continental’ during one part of the year and ‘intercontinental’ during another part of the year, especially when seasonality in production plays a role. For intercontinental supply chains, adequate governance systems are more and more required to balance the needs and requirements of parties at both ends of the chain. Vertically-integrated governance systems based on ‘ownership’ or ‘hierarchy’ may be better equipped to take into account the interests of all stakeholders in the supply chain compared to a spot market based system. The same holds for channel actors participating in a contractual governance system under the condition that all channel members consider common interests such as sustainable use of resources and quality requirements of final customers as a necessary part of the contract conditions. This can also be realised in a voluntary governance system where the interests of all stakeholders are matched by joint planning in supply, logistics and marketing.

2.3. Channel choice and quality performance

2.3.1. Standards, labels and brands

With increasing globalisation, the physical distance between producers and consumers of food products tends to increase which implies that actors at both ends of the chain are not easily aware of each others needs, opportunities and constraints. Consumers

might or may not be aware of the conditions under which producers (have to) work and producers may not understand the legitimate concerns of (segments of) consumers about their wishes with respect to food safety and food quality. Concerns related to resource use refer to land degradation, pollution of the environment and reduction of biodiversity; social responsibility issues refer to e.g. abuse of the labour force or child labour; and food quality and safety concerns may bother various classes of stakeholders, e.g. suppliers, buyers and both internal and external institutions. This situation asks for the development of institutions and governance systems in which these concerns can be adequately addressed. Decisions and activities related to corporate social responsibility (CSR), generally represented by the triple P (people, planet and profit) try to address these issues: ‘The need for governance is reinforced in certain markets by increased concerns about labour, environmental (sustainability) and/or product safety standards, either through legal regulations or stakeholder (e.g. consumer, government and NGO) pressures’ (Dolan and Humphrey, 2000).

Institutions are designed to address these corporate or chain responsibility issues. Standards have been developed to stimulate social responsible behaviour and to address quality or sustainability issues. For example, eco-labels aim to address issues regarding the sustainability of natural resources (e.g. FSC, MSC, SAI), fair trade labels aim to address the value-added distribution in the supply chain (e.g. Max Havelaar, Fair Trade, Utz Kapeh), food quality labels aim to address consumer concerns in food safety (e.g. ISO, HACCP), and brands of food product aim to safeguard a range of consumer values including quality, reliability, food safety, texture, taste, etc. (e.g. Chiquita, Dole, Douwe Egberts). These institutions consider both consumer and producers interests and are expected to play a key role in promoting social responsible behaviour. They are particularly relevant for governance systems without (much) channel leadership as is the case in traditional or conventional supply chains where each pair of stages in the channel is usually connected by a spot market. Competition is thus gradually shifting towards the supply chain level (see Box 1).

Box 1. Shifting frontiers of competition.

Traditionally, market competition has been analysed at the level of *countries* (i.e. Heckscher-Ohlin theory). New management approaches increasingly draw attention to competition between *firms* (Porter). More recently, competition is considered to take place amongst integrated *supply chains*. This may end up with competition between (private) *labels* or *grades and standards* (G&S).

2.3.2. *Subcontracting and outsourcing*

As indicated before, one and the same supply channel can be a conglomerate of several modes of governance (e.g. Ponte and Gibbon, 2005). This is closely related to the outsourcing (i.e. make or buy) decision in various stages of the supply channel. Outsourcing requires a common understanding about contract conditions (Fafchamps, 2004) including quantity, quality, delivery time and conditions of payment. This common understanding can be improved by shared norms or standards, norms to protect societal values or the environment, or through trust that is based on repeated interactions (Ponte and Gibbon, 2005).

Subcontracting is frequently used to supply rather standardised products to downstream agents, especially when it concerns production processes with limited risks for quality degradation (Key and Runsten, 1999). However, for more vulnerable products where production and processing conditions are critical to achieve certain defined quality attributes, more integrated quality management systems will be preferred. Whereas outsourcing is mostly based on labour-intensive activities (thus taking advantage of lower labour costs in developing countries), improved quality management tends to become more capital-intensive and is likely to be located where capital costs can be better controlled.

2.4. Channel choice and value-added distribution

2.4.1. *Delivery contracts*

Channel decisions are expected to contribute to an optimal flow of products or services from producer to final user or consumer. Supply chains or marketing channels aim to adjust the discrepancy between the quantity and quality of both the product offer and demand. To be effective and efficient, the supply channel needs to provide some way of routinisation of transactions, e.g. by means of standardisation and codification (Gereffi, 2003) or by using conventions with respect to quality, procedures, weights, measures, mode and time of delivery (Ponte and Gibbon, 2005).

To this end, written or oral contracts can be agreed that include the main attributes of routinisation. These contract attributes include several marketing functions, for example:

1. Physical functions, e.g. processing and logistics (e.g. transport and storage).
2. Exchange functions, e.g. negotiation on contract conditions, visual inspection, concluding a contract.
3. Facilitating functions, e.g. supplying or collecting market information, grading and sorting, trade financing, risk-coping mechanisms, contract enforcement. Sorting products into standardised grades is a facilitating marketing function. Grades and standards thus constitute 'an agreed-upon market language that can greatly simplify the marketing process and reduce marketing costs' (Kohls and Uhl, 1998).

For products obtained from agriculture, fisheries or forestry, there tend to be a large discrepancy of assortments that are delivered by initial suppliers and those demanded by final consumers. This is especially true for unprocessed food products. For example, potatoes are harvested in a range of sizes and qualities, or fish is caught in many species and sizes. The sorting function, based on a relevant and a commonly agreed-upon grading system, aims to bridge the gap between the assortment as generated by the initial supplier and the assortment as demanded by the consumer. This sorting function includes:

- Sorting out: breaking down of a heterogeneous supply (e.g. potatoes just harvested) in homogeneous lots.
- Accumulation: bringing similar stocks (e.g. the smaller ones, seed potatoes) from a number of sources together.
- Allocation: breaking a homogeneous supply down into smaller lots (e.g. lots of one tonne of seed potatoes for several buyers).
- Assorting: building up of an assortment for resale (e.g. several lots of seed potatoes of different varieties for a particular buyer).

The sorting functions strongly affects value-added distribution (e.g. Van Tilburg *et al.*, 2006). When more detailed sorting is introduced which is tailored towards different consumer categories and market outlets, local producers could capture a higher share of the overall value added than in case of less sophisticated sorting procedures (see Section 4.2).

2.4.2. Dedicated suppliers

A central aspect of the channel decision is the issue of multi-channel integration. It involves decision-making about the most appropriate combination of channel options and participants needed to interact with the customer base. Selecting more than one channel may improve the performance of the relationships with the customer base. The (potential) customers may be reached through intermediaries, e.g. personal representatives or retail outlets, or through direct marketing, e.g. face-to-face or telephone, e-commerce (internet, email) or m-commerce (e.g. various mobile phone services such as sms).

Payne and Frow (2004) distinguished several main channel strategies from *mono-channel provider strategy* (interaction with customers through one main channel) to a *integrated multi-channel strategy* in which the full range of channels is used to serve customers without influencing the customer's choice.

Channel choice used to be the initiative of the most powerful player in the supply chain or marketing channel. In times of increasing scarcity of resources, the power balance may shift towards the *supply side*, but in times of increasing abundance the power balance tends to be concentrated at the *demand side*. Hingley (2005) described this phenomenon for agro-food supply channels in the United Kingdom. There has been a shift in power within food marketing channels towards multiple retailers,

where the retailer is seen as the main gateway to consumers and the gate-keeper between producer and consumer. In this view, retailers will continue to reduce the number of food suppliers and try to develop, consequently, exclusive relationships with fewer, preferred, single-source or dedicated partnerships. Gibbon (2001) and Hingley (2005) discuss the characteristics of such *trader-driven chains* where the power basis is shifting to super-middlemen or international traders. Main characteristics of these chains are (Gibbon, 2001): low value-to-weight ratio, dispersed and seasonal supply patterns, strong tendencies to market saturation and a segmented demand side. Such reduced market competition is likely to result in a more limited value added share accruing to primary producers (see Section 5.2).

3. Governance regimes

3.1. Introduction: business transactions in developing countries

Companies in agro-food chains are linked through transactions. Transactions between companies have a number of features with specific implications for businesses in developing countries:

- Business transactions are subject to uncertainties, regarding quantities, quality, delivery conditions, price, etc. Especially developing country business relationships are subject to many uncertainties caused by poor physical infrastructures (storage/cooling facilities, roads, telecommunication, etc.), weak institutional infrastructures (government support, sanction systems, etc.), unbalanced trade relationships (dependencies, opportunistic buyer behaviour) and unfavourable social and political conditions.
- Transactions are enabled and need to be supported by information exchange (about characteristics of the product/service, production, delivery conditions, etc.). Information exchange between companies in developing countries is in many cases hampered by large information asymmetries between chain partners, lacking communication infrastructures, and diffuse market channel structures. This makes *ex-ante* monitoring of transactions difficult.
- Opportunism. Uncertainties as mentioned above may easily force companies at different stages in the chain to opportunistic behaviour so as to be able to sell their products. However, the major incentive for parties to behave opportunistic is profit maximisation. Opportunistic behaviour may imply adverse selection (hidden characteristics) and moral hazard (hidden actions).
- Transactions may be supported by (specific) investments (e.g. in packaging materials, cooling installations, transportation means, etc.). Such investments can strengthen mutual relationships. On the other hand, transaction-specific investments require more integrated governance mechanisms to safeguard against opportunistic behaviour. Other important incentives for transaction-specific investments in developing countries are the poor (physical) infrastructures that make investments to support business relationships necessary in many cases. (David and Han, 2004; Grover and Malhotra, 2003). This is particularly the case

in modern retail driven food chains, for example, investments in storage facilities, transportation means, communication, training, etc.

- Transactions vary in regularity and frequency from one-time transactions to transactions on a regular basis. Frequency of transactions between the same business partners varies among market channels and depends on risk behaviour and reward structures in different channels.

3.2. Channel choice and governance regimes

Channel choice decisions may have wide implications for the selected governance regimes, while interactions between supply chain agents can be shaped through different procedures, ranging from spot market exchange to contract farming.

3.2.1. Governance, transactions and trust

Transactions between companies are supported by governance mechanisms. The choice of governance mechanism is largely dependent on the costs of transactions, information asymmetries between parties, and social and cultural elements such as family relationships and village social structures (Omta *et al.*, 2001).

Transaction costs consist of *ex-ante* costs (searching for potential exchange agents, screening of potential agents, bargaining) and *ex-post* costs (transfer of property rights, monitoring compliance with contractual terms, enforcement of sanctions in case of non-compliance). If transaction costs are low, economic actors will favour market governance. If they are high, they favour contracting or integration, thereby lowering these costs. Governance forms can range from arm's-length contracts (market), preferred suppliers, single sourcing, network sourcing, strategic partnership to internal contracts with vertical integration (Cox, 1996). Key and Runsten (1999) specify under which particular conditions each type of governance prevails, focussing on the role of input and output market imperfections as a major motive to rely on contract farming or vertical integration.

In communities with strong social structures trust plays an important role in the choice of governance mechanism. Trust is dependent on the duration of a relationship, consistency of exchanges between parties and on (economic and social) reputation. In this respect, trust often replaces more integrated governance mechanisms as a safeguarding against opportunistic behaviour and to keep transaction costs low.

Modern market-oriented chains have the tendency to become shorter as intermediaries between producers and chain downstream parties become superfluous because of the emergence of direct trading relationship between large producers (or producer groups) and downstream parties. An example is the transformation of export-oriented producers to producer-exporters in some countries in order to lower transaction costs and exert full control over the supply chain. Inter-company relationships in these chains are often enforced by (transaction-specific) investments of processors or

exporters (such as investments in cold stores, seeds, pesticides, credits) to decrease delivery uncertainty and increase quality and quality consistency of deliveries.

3.2.2. Contracts

Contracts represent a common governance mechanism. Typical elements of a contract include: product quality (standards, consistency), delivery conditions (timing), price, information exchange (e.g. deviations), order frequency and timing, payment conditions, transportation specifics (e.g. cooling), packaging, traceability, promotion, sanctions in case of non-compliance, contract duration. Quality standards and certification are in particular relevant for business relationships in food chains and are often included in contracts. In vertically integrated companies certification by an independent party is of less importance, although the use of standards may be required.

One can choose for a classical version of a comprehensive contract (where everything is fixed *ex ante* for the entire duration of the contract, covered by the law of contract) or a relational version (allowing for gaps not closed by contract law, embedded in a social system of relationships and subject to continuous re-negotiations). Because there is no such thing as a ‘complete’ contract—especially not in developing countries with weakly developed institutional structures—many companies tend to prefer relational contracts implying interpersonal relationships and trust.

3.3. Governance and quality performance

3.3.1. Quality certification

Since the 1990s, Western retailers have defined various standards for the production and processing of food, such as British Retail Consortium (BRC), EUREP-GAP, SQF. Major aims of private food safety standards are (Vellema and Boselie, 2003):

- to improve supplier standards and consistency, and avoid product failure;
- to eliminate multiple audit of food suppliers- manufacturers through certification of their processes;
- to support consumer and retailer objectives by “translating” these demands through the chain;
- to provide concise information to assist with a due diligence defence in case of food incidents.

These standards are now applied by supermarkets and importers all over the world to coordinate supply chain activities and control food quality and safety. Retailers and industries increasingly demand for certification of production processes and facilities of producers and processing companies in developing countries, according to these standards (Jahn *et al.*, 2004). From an industry perspective, due to the high costs of certification and further differentiation of quality and safety standards by (Western) retailers and food industries in recent years, private standards tend to strengthen vertical relationships in food chains. This is one of the major rationales for the

emerging competition between (international) food chains in stead of competition on company level.

For many developing country producers it is difficult to comply with these quality standards (Vellema and Boselie, 2003; Giovannucci and Reardon, 2001). Small producers are in most cases excluded from these chains because of high certification costs (for producers) and high monitoring costs (for buyers). An interesting example of this phenomenon is shown by Boselie and Buurma (Vellema and Boselie, 2003). In their study on grades and standards in Thailand, they described the transition from a traditional supply chain system where personalised relationships in which family relationships and individual strategic motives prevailed above company profits to a preferred supplier system between wholesalers and buyers. Professional large-scale producers remained in the supply chain after introducing the new system. As they experienced: 'Changes in grades, standards and certification practices have tended to exclude small firms and farms from participating in market growth because of the implied investments.' (Vellema and Boselie, 2003: 149) However, in some cases we now see inclusion of small-holders in modern quality schemes, e.g. through cooperative governance forms or through retail or food industry programs (e.g. tea production in Kenya for Unilever).

3.3.2. Monitoring, control and sanctions

Several instruments can be used to reduce uncertainty and opportunistic behaviour from a buyers perspective (Hueth and Ethan, 2001):

- monitoring of supplier processes;
- input control (of suppliers);
- output quality control;
- residual claimancy (sanctions).

Quality and certification schemes lead to increasing control and more integrated governance, such as long-term contracts. At the same time they lower transaction costs. Mechanisms like output quality control and residual claimancy are common in any food chain. Monitoring of supplier processes and even input control are increasingly applied by Western retailers and large food industries in developing countries. These uncertainty-reducing instruments are embedded in more integrated governance mechanisms, such as contracts or vertical integration (Sections 2.2 and 2.3).

Above-mentioned instruments can be supported by operational management systems. Most relevant management systems in the context of food supply chains are quality systems and logistics systems, supported by information systems (Lancioni *et al.*, 2000; Porter, 2001; Van der Spiegel, 2004). Inter-company quality systems concern monitoring of supplier processes and output, tuning of quality systems in the chain (harmonisation), exchange of quality information (quality requirements, feedback information, etc.), communication of customer demands and complaints to suppliers. More integrated governance mechanisms are in general accompanied by integrated

quality systems (Section 4.2). Quality of food is also strongly dependent on logistics systems in food chains. These systems concern exchange of planning data (harvesting, storage, transportation), post-harvest storage and transportation (cooling, type of vehicle depending on type of product and distances in time), order-delivery cycle (frequency, demands), use of information and (tele)communication technology (internet, cell-phones, etc.). Quality and logistics systems are in many cases enabled and supported by ICT technologies. New communication technology such as cell phones can be used for quality data exchange and strongly improve logistics planning, thereby improving the quality of fresh products.

3.4. Governance structures and value-added distribution

3.4.1. Power and bargaining

Differences in market power and dependency relationships have—in addition to trust—a clear impact on the (choice of) governance regime in trade relationships. A powerful party can dictate governance mechanisms, e.g. direct marketing with Western retailers leading to integrated contract relationships. Since institutions or formal rules of behaviour that facilitate market exchange tend to be absent or weakly developed in many developing countries (Fafchamps, 2004), governance regimes in such chains are often diffuse, consisting of many interlinked agreements. This also implies that exchange tends not to be based on conventions, but on power and bargaining.

Small-scale producers depend in most cases on downstream parties in the chain, such as intermediaries, transporters or exporters, for their input supplies, credits and market access. Banks are mostly not eager to finance smallholders in general, and more specifically perishable products because of the high risks involved. Dependency relationships easily lead to imbalanced buyer-supplier relationships. In most of these chains, no written contracts exist between smallholders and their (larger) customers. However, the embeddedness of small scale producers in a network of social relationships can provide them with social capital to support their (vertical) business relationships (Lazzarini *et al.*, 2001; Coleman, 1990, Uzzi, 1997). Opportunity for producers to establish collaborative horizontal relationships such as purchasing or marketing cooperatives, may deliver economies of scale that may strengthen their bargaining position and allow for joint investments in production, marketing and distribution. Such collective action proved to be rather effective for linking smallholders with major market outlets (Section 4.3).

3.4.2. Market differentiation

Quality demands, internationalisation and market differentiation have led to the emergence of distinct food sub-systems with specific quality and safety requirements (e.g. local, national and international market), leaning on different market channels and with different governance structures, and ranging from vertical integration or contracts to spot market relationships (see Figure 1).

Linking market integration, supply chain governance, quality and value added

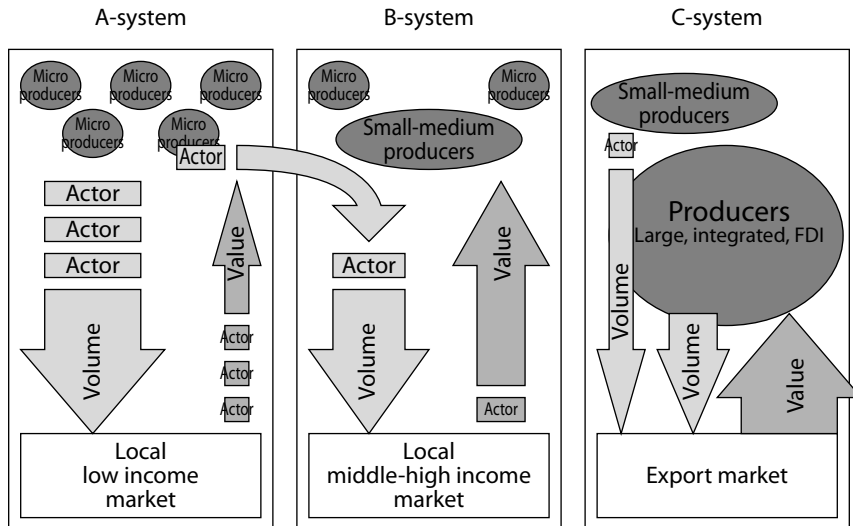


Figure 1. Agricultural sub-systems in developing countries (Adapted from Ssemwanga, 2005).

Figure 1 illustrates the key distinctions between three sub-systems. The A-system can be characterised as the local low-income chain. Producers are usually small with traditional production systems. These chains aim at local market outlets with staple products. Because of many intermediary parties (traders), A-system chains are relatively long, whereas most of the chain participants add little value. A-systems in developing countries deliver a high share of agricultural production volume, but generate relatively little value. The B-system can be characterised as the local middle to high income chain. They aim at the emerging supermarket sector in many developing countries. Most of the volume in these chains is delivered by small/medium size producers, organised in cooperatives and/or linked in subcontracting arrangements. Micro producers deliver inputs on demand to balance demand and supply in this system (buffer function). Although the production volume produced by B-systems is smaller than that of A-systems, the value generated is larger. B-systems increasingly produce according to national and sometimes international retail quality and safety standards. Finally, the C-system can be characterised as the export chain. It is completely focused on export, although low quality or rejected products are sold at the national, in many cases retail, market. The trend is towards increasing economies of scale and foreign direct investments. Export chains tend to become more integrated and shorter. Although volumes are small compared to local markets, the value added is relatively high.

These sub-systems are largely functioning independently, although occasionally one system may use input from another system to balance demand and supply, see e.g.

the flow between A- and B-system in the figure. The co-existence of such weakly-connected sub-systems poses important challenges to the development of harmonised quality and safety standards in developing countries.

4. Quality performance

4.1. Introduction: food quality attributes

A food supply chain delivers food products to consumers at the end of a chain. This is an obvious statement. However, foods are typical products in the sense that they can potentially harm consumers (i.e. the food safety aspect), that they spoil rather easily (i.e. shelf life is important), that they provide nutrients and energy (i.e. nutritional aspects), and that they provide pleasure (i.e. sensorial aspects). Foods are natural products from biological origin, or they are made of natural ingredients. This implies that they are subject to biological variation that is not fully controllable. Furthermore, they are subject to change, either intentionally (by processing) or unintentionally (by uncontrollable outside events) on their way from primary production to use by the consumer.

At the end of the food chain, the consumer expects high quality food at a reasonable price. What then is quality? Although everyone uses the word, it depends on the actor in the chain what he means by it. The quality of an apple is different for a breeder than for a consumer. The perspective taken on quality performance is that quality needs to be specified in one way or another, that we need to be able to understand, and perhaps to exploit biological variation and its effect on quality, and that we can manipulate and control quality by technological measures (Van Boekel, 1998).

In any case, the keyword is quality. Although everyone has an opinion about food quality, it is hard to define it specifically. Yet, this is what needs to be done. A very general description of quality is: to satisfy the expectations of the consumer. This shows that quality encompasses two aspects, namely satisfaction and expectation. Expectation has to do with previous experience, information concerning the product, and lifestyle, satisfaction has to do with actual consumption ('the proof of the pudding is in the eating'), and when the experience matches the expectation, a consumer will be satisfied, otherwise not. This description indicates that quality has subjective as well as objective aspects. Figure 2 summarises this way of thinking.

As for the intrinsic and extrinsic quality attributes, intrinsic quality attributes are defined as the ones that are physically linked to the product (such as protein content, taste, microbiological condition, etc.). Extrinsic quality attributes are not directly a physical property of the food but they are connected to it. This pertains to religious rules that forbid eating certain foods, for instance, no pork meat for Jews and Muslims. That implies that pork meat has no quality for a Muslim but the same product does have a certain quality for a non-vegetarian Christian. Brand names are

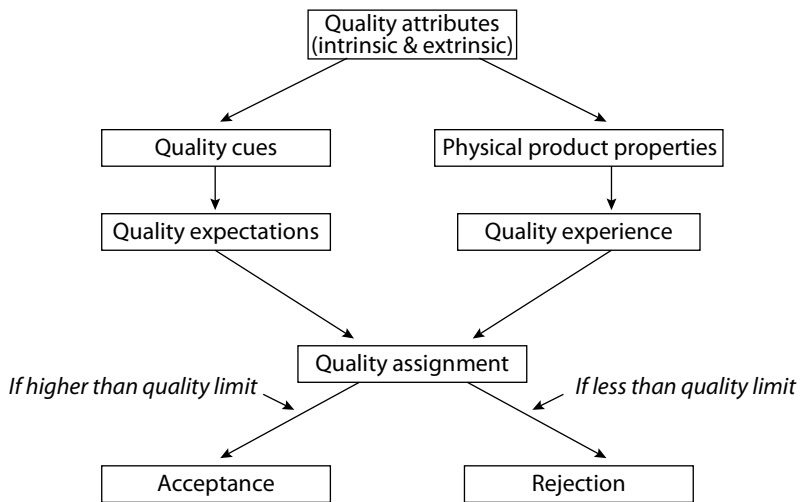


Figure 2. Highly schematic picture of assignment of quality.

another example of extrinsic quality attributes. Organic food is yet another example, where some consumers value the same product differently when they are informed that it is produced by organic agriculture. Extrinsic quality attributes are obviously as important as intrinsic ones. However, extrinsic quality attributes are much more difficult to control by a technologist. Intrinsic quality attributes can be influenced by technology by taking measures such as temperature, pH, gas atmosphere conditions, packaging, etc.

A major problem in the discussion about quality is that different chain actors have a different interpretation of the concept of quality. Ultimately, the goal should be that the end-user, i.e. the consumer is satisfied, but this is too simple a statement. For instance, pest-resistance of vegetables and fruit will not be considered to be very important by a consumer, but it is of utmost importance for the breeder and the grower. Table 2 lists some different meanings for the concept of quality. The challenge is to reconcile these different interpretations of quality, and it remains of utmost importance to co-operate in the chain to deliver a desired end quality, but by taking also into account the needs of the actors involved.

The intrinsic, and to some extent also extrinsic, quality attributes of a product depend on certain critical control points (CCPs) to be set at the various supply chain stages; these CCPs are different for each commodity. For instance, for certain tropical fruits the temperature should not come down below a critical temperature to avoid chill injury, whereas for milk products it is just the other way around: above a certain critical temperature the shelf life and safety are in danger. The critical control points

Table 2. Interpretation of quality by various chain actors.

Actor	Quality aspects
Grower	vitality of seed, yield
Cultivator	productivity, uniformity, disease resistance
Auction	uniformity, reliability supply, constant quality
Distribution	shelf life, availability, sensitivity to damage
Retailer	shelf life, diversity, exterior, little waste
Consumer	taste, healthy, perishable, convenience, constant quality

can be influenced by technological measures (such as temperature control) as well as by organisational measures guiding human behaviour. It is for this reason that quality performance is strongly influenced by channel choice (Section 4.2), governance regimes (Section 4.3), and the distribution value added (Section 4.4), and *vice versa*.

4.2. Channel choice and quality performance

The key question related to channel choice is about how to reach the final customer in the most optimal way, where most optimal are interpreted here as: the best quality possible. It is obvious that quality performance is directly linked to the choice of actors that make up a food chain. Channel choice thus offers opportunities as well as limitations for improving quality management.

4.2.1. Exploiting variation in quality

Foods are derived from biological materials and are therefore subject to variation. For instance, the nutritional value may be variable, but also the sensorial quality (i.e. taste, texture, flavour). Consumers will notice these differences and react to it by assigning a certain quality (Figure 2). However, quality expectations are not static and one consumer may assign a very different quality to a product than another. This also depends on the context where consumption takes place. Typical consumers categories can be characterised by certain consumer images, For instance, Linnemann *et al.* (1999) came to the following classification:

- the hedonic consumer;
- the price-conscious consumer;
- the nature and animal-friendly consumer;
- the environmentally conscious consumer;
- the convenience consumer;
- the variety-seeking consumer;
- the health-conscious consumer.

An interesting aspect is that one consumer can switch from one type to another. Nevertheless, from a population perspective of characterising consumers, such a general classification certainly makes sense, since the aspect of variation in quality can probably be linked to these various consumer types. These different types of consumers can be reached through specific marketing channels (e.g. convenience shops, supermarkets, open markets, etc.). Adequate sorting of products can be helpful to tailor product categories towards specific consumer wants (Section 2.3).

4.2.2. Food quality and technology: integral quality control

Channel choice also implies the choice for a certain technology. From the very beginning of humanity, people have tried to preserve food by drying, salting, smoking, fermentation, etc. These age-old techniques still exist, though in modified form, in many cases. However, since nowadays problems can be tackled from a scientific perspective, most measures can be designed much more efficiently. As a result, it is now possible, in principle at least, to produce safe foods of very high nutritional quality in an efficient way. (This is—of course—not to say that there are no food problems anymore.) Basically, we can classify food technology processes in 4 classes (Van Boekel, 2005):

- stabilisation or preservation;
- transformation;
- production of ingredients;
- production of fabricated foods.

Stabilisation is needed to achieve food safety and to reach a certain shelf life. Transformation increases the possibility to use raw materials in various ways. For instance, milk can be pasteurised or sterilised but it can also be used to produce butter or cheese, products that are completely different from the raw material. Transformation usually implies an improvement in food safety and shelf life (e.g. fermentation). Production of ingredients can be done in many ways, traditionally for instance by extracting sugar from sugar beets or sugar cane, but nowadays also via enzymes and micro-organisms. Production of fabricated foods encompasses man-made products such as bread, cheese, beer, wine. It means that various ingredients are used to produce a designed food.

Other technological measures that can be taken to influence quality performance are:

- measuring and analysing food properties;
- using chemical, biochemical, physical and microbial knowledge to influence processes within the food;
- choosing processing conditions to achieve defined quality attributes;
- changing conditions in the production of raw materials.

The selection of a certain delivery channel has a stronger effect on quality performance if the activities in the channel have a noticeable impact on the intrinsic quality attributes. For instance, if a product is very sensitive to the time it stays at a certain

temperature, then the residence time becomes critical to certain channels, as well as the ability of that channel to control temperature. Subcontracting and outsourcing may therefore be less indicated if such integral quality control is required. Optimal channel choice thus essentially depends on the ability of a channel to invoke certain required actions for quality performance.

4.3. Governance regimes and quality performance

4.3.1. Standards and quality enforcement

The choice for a certain governance regime will have an effect on quality performance due to monitoring costs for quality compliance. Quality compliance strongly depends on the way actors cooperate throughout the chain. If transaction costs are high, there will be a pressure on controlling costs for maintaining quality, i.e. costs needed for technological measures and costs needed for management systems. Depending on the organisational structure of the chain, the motivation for innovations towards better quality performance may be low or high (Boom *et al.*, 2005). If a key player, like a supermarket chain, is able to enforce certain quality standards—such as EUREP-GAP—the actions of upstream agents are dictated by this key player.

Quality enforcement strongly depends on the possibility to measure certain quality aspects. Actors can try to achieve compliance to certain quality standards by defining rules and regulations. Usually, measures to be taken in order to safeguard *food safety* are launched by governmental institutions, such as the general food law within the EU. Van der Meulen and Van der Velde (2004, 2005) provide detailed information on food safety legislation. Measurements regarding quality in general are not enforced by governmental bodies, but chain actors can do so, resulting in well-known systems as BRC and EUREP-GAP (mainly from the retailer perspective). These are actually management systems that describe what chain actors should do, with the ultimate goal to achieve a certain quality standard at the end.

4.3.2. Food handling and quality assurance

If a certain quality needs to be reached, this has also implications for the choice of a governance regime: chain actors will need to cooperate in achieving the goal of reaching a pre-determined quality level. However, this may strongly depend on a particular commodity. In addition, rules and regulations may force actors to work along certain lines. If true chain reversal is to be reached, a supply chain should be designed with the ultimate goal to reach the defined quality standard. In other words, this calls for a situation where the choice for a certain quality dictates the structure and organisation of the supply chain.

Food quality is not only determined by the product itself, but also by the way people handle the food; by people we mean every actor in the chain, including the consumer. In other words, we should not only study food properties but also what people do with

the food when they distribute, store, and process foods. With such knowledge it can be attempted to design managerial systems in such a way that the resulting quality is optimal at the end of the chain. Managerial measures that can be taken in relation to quality performance include:

- transparent organisational and administrative systems;
- support activities for staff working within the food chain (knowledge level, motivation, experience);
- development of a quality assurance systems;
- development of policy regulations.

Several quality management practices have been described extensively by Luning *et al.* (2002) and Luning and Marcelis (2005), emphasising the interactions between changes taking place in products as well as the dynamics in the way the various chain actors handle food. Human dynamics can to some extent be influenced by administrative conditions. As part of a quality management system the installment of quality assurance (QA) is important. QA should guarantee the *fulfillment* of quality requirements and provides *confidence* in meeting customer requirements.

4.4. Value added distribution and quality performance

4.4.1. Location choice

If the value added is distributed in a adequate way (e.g. according to efforts devoted to production and quality management) over the actors, this will stimulate supply chain partners to maintain at least the quality standard, and probably will provide incentives for (co)innovation and to work together in a more coordinated manner. However, if such a high quality is reached this does not necessarily lead to a 'fair' value added distribution (Hueth *et al.*, 1999). The latter will depend strongly on where quality is critically influenced, which investments are required for this, and who has the power to enforce these measures. If the value is added mainly at the end of the supply chain, the actors at the beginning of the chain will probably not share, but if the quality critically depends on the performance in primary production, the primary producers need to be rewarded to assure the required quality. Location choice for quality management and upgrading activities thus strongly influences value added distribution.

4.4.2. Co-innovation and co-operation

One of the specific conditions of tropical food chains is the physical distance between production and demand. Aspects of importance are: to what extent can smallholders build up some negotiation power (for instance, through cooperatives), what role do middlemen play, which trade barriers exist, and how can branding and labeling become effective. In all these areas, there are many institutional barriers to obtain a value added distribution that may be most effective in terms of enhanced quality performance. It also depends critically on the type of commodity: more 'standardised' commodities

offer a fairly limited scope for value added redistribution (except through economies of scale), while for more dynamic and innovative supply chains cooperation between agents is required to improve competitiveness (Boom *et al.*, 2005). In any case, it pays off to make a detailed analysis of the market situation for particular commodities to identify where changes are possible to enforce a value added distribution that reflects the real efforts made by each of the chain partners to guarantee the required quality to be delivered to the final customer.

5. Value added distribution

5.1. Global value chains and rents

Value chain analysis is commonly used to assess the financial implication of supply chain organisation and management regimes for the distribution of value added amongst agents. Value added is defined as the difference between the selling price of output(s) and the purchase price of inputs, including the transformation and transaction costs involved in sourcing and selling. The size of value added depends on dynamic competitive advantages within the network, whereas the distribution of value added is determined by the comparative advantage of each agent and the prevailing internal governance and bargaining conditions (Lazzarini *et al.*, 2001).

Global value chains encompass three basic dimensions (Sturgeon, 2000; Gereffi and Korzeniewicz, 1994):

1. Spatial organisation and the (inter)national division of activities (i.e. deliveries from local producers to domestic markets and global retailers), related to the choice of particular channel strategies and the selection of market outlets.
2. Governance structure for linking different heterogeneous agents (i.e. authority and power relationships established through contracts and management controls that determine how resources are allocated and flow throughout the chain).
3. Input-output structure (i.e. set of products and services linked together in a sequence of value-added activities), reflecting the options for quality management and product/process upgrading.

Whereas value added is jointly created at different places and by different agents throughout the supply chain, its size finally depends on the downstream demand by, and satisfaction delivered to, the consumer. This market value is subsequently distributed 'backwards' and assigned according to the perceived contributions of all upstream agents. Value added can thus be divided and allocated into five major categories (Kaplinsky, 2000):

- trade rents (forthcoming from production scarcities or trade policies);
- technological rents (related to asymmetric command over technologies);
- organisational rents (related to management skills);
- relational rents (related to inter-firm networks, clusters and alliances);
- branding rents (derived from brand name prominence).

Trade rents are based on traditional comparative advantages, enabling agents to reap gains from different spatial environments by equalising factor returns through (inter) national exchange. Trade policies and market incentives can either reinforce or hinder this process. Individual firms may capture technological rents due to their control over specific production technologies. Organisational rents refer more particularly to the management capacity of the lead firm regarding the organisation of supply chain logistics. The last two rent categories, relational rents and brand name, are the least tangible components but have become most prominent in supply chain coordination and value added distribution. In the following, we will discuss how the processes of value added creation and distribution are influenced by channel choice (Section 5.2), governance regimes (Section 5.3) and quality management (Section 5.4), paying attention to both the conditioning factors and the resulting supply chain performance.

5.2. Channel choice and value chains

Kaplinsky (2000: 121) defines the value chain as the full range of activities which are required to bring a product of service from conception, through the intermediate phases of production (involving physical transformation and incorporating various producer services) to the delivery to final consumers (and its disposal after use). In reality, value chains of food products may also involve different secondary streams related to sub-standard products and waste.

The orientation of supply chains towards specific market outlets greatly influences the options and strategies for value added (re)distribution. First, the orientation towards certain markets segments with higher levels of chain control enables upstream agents to gain margins in the delivery process. Second, price and non-price incentives offered to supply chain agents can be helpful to improve the delivery efficiency for particular market outlets.

5.2.1. Market segmentation

Value added distribution is essentially different in buyer-driven supply chains compared to more traditional producer-driven chains (Gereffi, 1994). In the food sector, retailers and branded manufacturers play a pivotal role in setting up decentralised production networks while preserving for themselves a key role in product development and marketing. The subordination of physical production to the design and sales functions enables control over how, when and where production takes place, and how much profit accrues to each stage and agent of the supply chain.

The value added share that remains with primary producers is mainly dependent on their relationships with downstream partners. Specific investments for guaranteeing reliable deliveries and consistent product quality are a stimulus for more exclusive delivery arrangements. Otherwise, long-term delivery contracts are required to enable producers to invest in quality upgrading under conditions of high risk exposure (Saenz

and Ruben, 2004). Sustainable access to higher value market segments is thus a key condition for capturing additional rents.

Supply chains and networks of tropical foods are characterised by heterogeneous products delivered by a diversity of producers to multiple market outlets. Given the variability of product quality performance (Section 4.2), producers need to search for simultaneous linkages with different markets. In this way, also sub-standard products and waste can still be valorised. Losses in production, transport and processing may represent up to a quarter of the total value. Heterogeneity in product quality can become an opportunity for smallholder development if a better match is made between the inherent variability at the supply side with different specific market segments. Long chains of semi-perishable products suffer from high risk of quality degradation, and storage, handling, transport and logistic conditions have a strong impact on freshness and shelf-life of the produce. The common strategy for dealing with this variability in quality has been tailoring the supply chain towards 'average' quality. This might not be, however, the most effective approach, since variability can also be strategically exploited through the flexible management of quality differences for specific market outlets (Schouten *et al.*, 2004; Heuvelink *et al.*, 2004).

5.2.2. Market competition

Public policies can provide specific (dis-)incentives for linking local producers to particular market outlets. This has been for a long time the case with the so-called African marketing boards (for cotton, cocoa, coffee and tea, etc.) that virtually 'tied' producers to quasi-monopolistic export agents controlled by the state. Programs towards market liberalisation in most of these countries have been mainly justified with arguments that competition could enhance farmers channel choice options (Badiane, 2000). In practice, however, markets in developing countries still remain fairly thin and shallow, and most farmers are linked to particular outlets through pre-finance arrangements and forward contracts with middlemen (Fafchamps, 2004).

In principle, the engagement of producers with particular marketing channels will be based on criteria of efficiency and returns. Transparent channel options enable producers to allocate their land and labour resources in line with market demands, whereas global market conditions determine whether and how producers have equitable access to several outlets. The supply chain environment, particularly the degree of competition amongst buyers and the reduction of market entry costs (infrastructure, licences, fees and taxes, etc.) are critical for improving the bargaining opportunities on delivery prices and margins.

5.3. Governance regimes and value added distribution

The economic importance of value chain analysis is related to issues of participation and access to markets with implications for the allocation of economic returns (rents or margins). Rents usually accrue to agents according to their factor contributions

and ownership of resources, but could also result from purposive actions. Rents are dynamic in the sense that they can grow under scarcity and erode by competition. New rents are increasingly created in the intangible parts of the value chain (e.g. knowledge, R&D, brands). Moreover, new combinations of resources and improved coordination in governance structures provide additional returns to innovation.

The creation and distribution of value added in supply chains is governed by multiple factors (Humphrey and Oetero, 2000), like:

- access to market outlets and key consumer information;
- acquisition of production capabilities and prime resources;
- control of intangible competences (e.g. R&D, design, branding);
- nature of inter-firm linkages and governance (i.e. hierarchy in networks);
- prospects for reaching economies of scale and scope;
- legal and societal norms (CSR, fair trade, etc.).

Two processes are of particular importance for analysing the dynamics of value chains (Gibbon, 2003): (a) upgrading and (b) bargaining. Upgrading refers to the improvement of product specifications (specific quality aspects, like taste or convenience) or reorganisation of supply processes in order to increase total value added. Bargaining refers to redistribution of value added amongst supply chain partners, based on changing market or power relationships. While upgrading has the potential to create win-win situations, changes in bargaining gives rise to emerging conflicts.

Gereffi *et al.* (2005) identify three variables that play a key role in determining how global value chains are governed and transformed: (a) the complexity of information and knowledge required to sustain transactions, (b) the ability to codify and transmit this information and knowledge efficiently with limited specific investments, and (c) the capabilities of suppliers to respond to these requirements. With increasing complexities and decreasing codification, supply chain organisation tends to evolve from modular towards relational contracting (based on knowledge exchange between buyers and sellers). However, if suppliers face significant switching costs, captive networks are likely to emerge occasioning high monitoring and control costs.

5.3.1. Bargaining

The distribution of margins throughout the supply chains is subject to bargaining, involving both price and non-price dimensions. Agents with more specific assets and/or better access to information are able to capture higher margins (Humphrey and Oetero, 2000). Otherwise, institutional regulations (grades and standards) could limit bargaining options, while collective action could be used to influence the distribution of value added.

The value added is strongly determined by local (territorial) factors and institutional governance relationships. The notion of bargaining power is rooted in principal-agent theory, where agents can develop or gain bargaining power if they are able to reduce

their dependency toward other agents. Muthoo (2002) identifies key factors and processes that influence the bargaining power of particular agents, focussing attention on impatience and the risk of contractual breakdown under conditions of changing marketing options. Bargaining power is usually greater for products that can easily be stored without too much quality loss. Otherwise, bargaining power becomes lower when the threat of contractual breakdown is present. The availability of alternative outlets might increase bargaining power if these are sufficiently attractive. Agents could also increase their payoffs during the bargaining process by temporarily withdrawing their offers (hold-up). Such commitment tactics increase the bargaining power in supply chains that strongly depend on continuous deliveries. Finally, information asymmetries amongst agents may provide additional bargaining power to the actor with more or better connections to market outlets (Yan and Gray, 2001).

Trade and technological rents are particularly subject to bargaining, and final outcomes are mainly determined by differences in power relations and contract enforcement capacities. Delivery contracts between producers, processors and retailers can be based on simple specifications of observable characteristics (i.e. size, weight, colour, appearance) or include more complex criteria (i.e. quality, taste, reliability) and even process attributes (labour regime, environmental pollution). Strict enforcement of the latter aspects may require efforts of co-investment between supply chain partners and joint implementation of chain upgrading activities (Section 5.4). When quality upgrading becomes a more important criterion and governance regimes are focussing on process management, supply chain operations tend to be more interdependent. The incentives for compliance by local agents are directly related to their access to a fair share of value added that compensates for their investment efforts and risk exposure. Mixed contractual regimes with a combination of fixed rewards and performance-dependent bonuses usually offer better incentives for such stable and reliable partnerships (Saenz, 2006).

5.3.2. Collective action

Another strategy for relying on governance mechanisms for influencing value added distribution is based on collective action. This implies that similar agents at a specific level of the supply chain determine a joint strategy for coordinated negotiations. Most well-known examples include the organisation of producers' and marketing cooperatives (Ruben, 1998) and the arrangements made by supermarkets with a selective group of preferred suppliers (Reardon *et al.*, 2005).

As noticed before, value chains become increasingly differentiated (i.e. serving various outlets) and are therefore evolving from modular (sequential) governance towards relational governance (Gereffi *et al.*, 2005). Consequently, interdependence between agents involved in the food chain is increasing and traditional sub-contracting or outsourcing relations are gradually replaced by preferred supplier regimes (Reardon and Timmer, 2005). Integrated chain care and joint product development ask for co-investment under the explicit coordination of chain leaders (agro-food processors

and supermarkets). Consequently, the number of suppliers is usually strongly reduced (exclusion) while some processing functions are transferred upstream, eventually leading to greater interdependence between chain partners.

Collective action and horizontal integration can be helpful to improve the bargaining position of specific agents. Most important ingredient for effective collective action is the creation of trust between partners and the compliance of agreements (Ostrom and Walker, 2002). Hardin (1968) defines trust as ‘a willingness to rely on another person or institution when one expects the actions of that other person or institution to take you into account in some relevant way’. Bornschier and Volken (2005) distinguish different functions of trust as: (a) an asset of agents to stimulate firm growth, (b) a vehicle for knowledge acquisition and change, and finally (c) a conducive channel for diffusion of new technologies. Trust and reciprocity reduce enforcement and information costs for joint activities and thus enable more rapid systems adaptations. Fafchamps (2004) presents empirical evidence that trust relationships are of key importance for enabling access to information, technology and market opportunities, selecting job and credit applicants, risk sharing and penalising cheats. Trust and trustworthiness also reduce control problems of credible commitment. Better trust relationships are thus generally expected to have a positive influence on the income derived from rural businesses.

5.4. Quality management and value added creation

Most agricultural commodities and food staples face declining world market prices, and therefore gains from trade increasingly depend on dynamic competitive advantages created through processing, handling, quality differentiation and market segmentation. Major strategies for reaping the potential advantages of value added creation through improved quality management (at product and process level) rely on two pathways: (a) co-innovation, and (b) economies of scale and scope.

5.4.1. Co-innovation

Technological measures for improving quality and safety can only be successfully implemented when appropriate delivery regimes and governance structures, that provide clear incentives for alliances between all chain and network parties, are in place. Small- and medium-scale farmers and processing companies in developing countries face major difficulties in responding to more stringent quality demands due to information, investment and coordination constraints. Collaboration and co-innovation between chain and network partners are considered key elements for developing synergies amongst agents beyond their traditionally resource base (Porter, 1990). New competences such as flexible market orientation, dynamic capabilities that assist to explore emerging market opportunities, and supply chain relationships based on trust and commitment with business partners and other stakeholders (like NGOs) could enable the creation of economic value through dynamic and sustainable competitive advantages.

Joint innovation activities between supply chain partners could eventually culminate in the creation of differential rents based on private grades and standards (Reardon and Farina, 2002). This is particularly the case when public agencies are not able to enforce global standards or when (inter)national regimes for tracking and tracing (like EUREP-GAP, SQF) ask for additional investments that are warranted through market segmentation. In many cases, smallholder producers face major difficulties to keep up with these standards, unless specific support and training is provided.

5.4.2. Economies of scale and scope

Coordination and integration in international supply chains mainly depend on trust, reputation and agency coordination. Learning and (co-)innovation are nowadays considered as key components for supply chain upgrading that add value to the produce. Under increasing competition, producer surpluses are systematically channelled into consumer surpluses, and therefore supply chains are involved in a permanent process of re-positioning. Smallholders can remain involved in this process using different strategies for improving vertical and horizontal cooperation and enhancing economies of scale and scope (Kaplinsky, 2000).

The distribution of value added is related to the degree of complexity of transactions (uncertainty), the level of coordination between agents (frequency), and the spatial fragmentation of delivery networks. Increasing complexities—due to more demanding food safety and quality requirements—could be addressed by standardisation, but also ask for additional insurance to enable the required specific investments (in cooling, packaging, etc.). Supermarket requirements for reliable deliveries and permanent shelf provision require more stable relationships with preferred suppliers. The same holds true for global sourcing strategies based on simultaneous linkages with various suppliers that cover particular time windows (e.g. in mango).

Spatial concentration of smallholder producers (e.g. tea in Kenyan highlands) could provide some agglomeration advantages (or cluster effects) that facilitate the transmission of entrepreneurial information and save on external costs (Rocha, 2004). Location choice of value added activities is, however, only partly determined by cost motives (e.g. cheap labour in production countries) and may be seriously hindered by higher import tariffs charged on processed commodities. The potential competitive advantage of developing countries is strongly influenced by progressive tariffs and SPS standards that may reduce local options for adding value.

6. Outlook

In this chapter we discussed some major interactions between the four strategic dimensions of supply chain organisation of vulnerable (perishable) tropical agro-food products, namely (1) channel choice (how to reach the final customer in the most optimal way?), (2) governance regime (how to reduce transaction costs and enhance

cooperation and trust?), (3) quality performance (how to manage food technology processes in order to improve quality levels?) and (4) value added distribution (how to guarantee an acceptable remuneration to supply chain partners?).

Global supply chains of tropical food products often face large uncertainties in terms of delivery volumes, frequency and quality compliance. Given the irregular supply, the strong variability in quality, the limited market competitiveness and the dispersed nature of smallholder production, future perspectives for enhancing integrated supply chain management of agro-food chains from developing countries critically depend on the possibilities for effectively dovetailing technical, economic and institutional approaches to supply chain optimisation. Some main challenges for improving supply chain performance can be identified in the following areas: reinforcing channel integration, optimising chain governance, enhancing quality performance, and improving value added distribution.

6.1. Reinforcing channel integration

Channel decisions regarding tropical food commodities face many difficulties due to the usually long distance between primary producer and final consumer. Therefore, a comprehensive approach is required for bridging the gap between local supply and external demand. Given the perishable nature of many tropical products and the highly uncertain and risky environment of the supply chain, more central governance may be required to guarantee that the objectives of all stakeholders can be effectively attained.

Improvements in the marketing system depend very much on the institutional, socio-economic and natural environment that prevails in a particular stage of development. In early stages, reduction of transaction costs and risk are of primary importance. Subcontracting and outsourcing can then be used to deliver rather standardised products with limited risks for quality degradation to downstream agents. In subsequent stages, vertically-integrated governance systems based on 'ownership' or 'hierarchy' may be better equipped to consider global supply chain interests such as sustainability of resource use and quality requirements of final customers. Finally, standards and labels are developed to safeguard a wider range of consumer values including quality, reliability and food safety.

Delivery modes and contractual conditions are critical to value distribution. Adequate sorting of products can be helpful to tailor product categories towards specific consumer segments, thus enabling local producers to capture a higher overall value share. Otherwise, increasing concentration at the market side shifts the power balance towards retailers which maintain exclusive relationships with a few preferred suppliers under a dedicated partnership.

6.2. Optimising chain governance

Supply chains in developing countries usually consist of distinct food sub-systems with specific quality and safety requirements for local, national and international market outlets. The co-existence of such weakly-connected sub-systems poses major challenges to the development of harmonised quality and safety standards. Since complete contracts are difficult to enforce in developing countries with weak institutional structures, many companies tend to prefer relational contracts based on personal relationships and trust.

The choice of governance mechanism is largely dependent on the costs of transactions, information asymmetries between parties, and local social-cultural practices. More market-oriented chains have the tendency to become shorter as intermediaries between producers and downstream parties become superfluous, giving preference to direct trading relationship between large producers and retailers. The formation of marketing cooperatives that deliver economies of scale may be an effective strategy for linking smallholders with major market outlets.

Delivery contracts are increasingly used for reducing transaction costs and guaranteeing quality compliance. When transaction costs are low, economic actors will favor market governance, but if they are high contracting or vertical integration is preferred. Quality certification and strict procedures for monitoring, control and sanctions are used to reduce uncertainty and control opportunistic behaviour.

6.3. Enhancing quality performance

Quality refers to the capacity to satisfy the expectations of the consumer, thus including both subjective as well as objective aspects. Consumers value intrinsic and extrinsic quality attributes, but chain actors have a different interpretation of the concept of quality. Quality attributes of each specific product depend on certain critical control points at various stages of the supply chain, that can be influenced by technological practices as well as by organisational changes guiding human behaviour. If these activities critically depend on efforts made in primary production, the latter need incentives to be rewarded in order to assure the quality compliance.

Given the large natural variation in product quality of food products, the major challenge is to identify specific consumer categories and market outlets for each category of product. The orientation towards certain delivery channel invokes quality surveillance procedures. Quality upgrading requires governance regimes with strong cooperation, sometimes including co-investment between chain partners. Therefore, the choice for a certain quality already dictates the structure and organisation of the supply chain. Subcontracting and outsourcing may be less indicated if integral quality control is required.

6.4. Improving value added distribution

Improving the competitive position of developing countries' smallholders in tropical food supply chains is mainly dependent on three institutional interfaces: (a) trade and technological rents that can be captured through improved linkages with market channels and outlets (under conditions of market competition), (b) organisational rents that emerge from improved supply chain governance regimes and can be optimised through bargaining and/or collective action, and (c) relational linkages and branding rents forthcoming from process or product upgrading that generate dynamic competitive advantages.

In practice, these three processes closely interact and reinforce each other, but could also easily lead to exclusionary tendencies. Public action is therefore required to maintain a competitive market structure (low entry costs) and to guarantee adequate information diffusion. Voluntary action by farmer organisations and cooperatives will be helpful to increase countervailing power. Finally, raising consumer awareness could become a helpful instrument for supporting specific brands (Fair Trade, FLO and Eco) that guarantee a larger value added share to smallholder producers.

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**Market outlets
and
governance regimes**

Determinants of market outlet choice for mango producers in Costa Rica

Guillermo Zúñiga-Arias and Rued Ruben

Abstract

Different actors are involved in the mango supply chain from Costa Rica conducting transactions both at the export and the local market. Producers face strategic choice between (a) market outlets devoted to exports where quality attributes such as, size, sugar content, absence of external and internal damage are key determinants for the transaction and the business relationship, and (b) local markets (composed of wholesaler, retailer, middlemen among others), where different qualities and delivery modes can be accommodated. In this article we disentangle factors that influence market differentiation between the export and local market in the Costa Rican mango sector, to identify major determinants for differences in outlet choice. We argue that market selection is dependent on farm household characteristics, production system, price attributes and the market context. The selection of a certain type of outlet is also related to a specific contract configurations (i.e. quality control, payment mode, type of agreement, volume, rejection rate, etc.). Based on a field survey regarding outlet choice decisions amongst a sample of 94 farmers in the major mango producing region (Central Pacific zone) of Costa Rica, we use a Tobit model and ANOVA analysis to assess the determinants of market outlet choice. We discuss the structural, institutional and behavioural factors that typically determine farmers' choices for a specific market channel orientation. We find that for the export market that vertical integration is already advanced: producers deliver on demand of the buyer and face higher rejection rate, but in compensation they receive access to stable market outlets, input and (subsidised) credit, and benefit from lower transport and delivery costs. For the local market, the producers' experience and their historical knowledge and relationships with the market are of key importance for finding suitable market outlet.

1. Introduction

The organisation of the mango supply chain in Costa Rica includes a large number of different agents involved in numerous transactions and oriented towards multiple market outlets. Mango transactions differ in terms of volume, quality, price and delivery frequency, while the produce can be sold both at the local open market and through wholesalers, and/or at international markets through multinational trading companies. Relationships between producers' associations, (local and international) traders, retailers and consumers are structured through a complex sequence of delivery transactions.

Mango (*Mangifera indica* L.) is an exotic tropical fruit in high demand all around the globe. In Costa Rica, mango was originally used for home consumption as well as for providing shadow to plantations and homesteads. In the early 1980s, mango was increasingly considered by smallholders as an opportunity to grow a commercial product for the export market.

There are nowadays about 150 different varieties of mango known worldwide, but only a few varieties are of commercial importance (i.e. *Haden, Irwin, Keith, Tommy Atkins*). The first imports of mango to Costa Rica took place in 1796 from different Caribbean countries (Lezema, 1989). In the early 1970s, the University of Costa Rica (UCR) introduced some special red and yellow varieties to the *Orotina* region for commercial purposes (Mora *et al.*, 2002). In the beginning of the 1980s, the production of red mango varieties for (European) export markets became more important, leading to a reduction of the local cultivated area of yellow mango (Jirón, 1995; Buzano, 1997).

The Costa Rican market configuration is characterised by a simple product flow for the export market, but includes far more complex configurations for sales at the local market. For the export market, most of the produce originates from producer associations that deliver to a cooperative, which packs the mango and sells it to the exporter. In the local market, there are many independent producers, as well as organised producers and intermediaries. Some of them deliver produce rejected at the export market to several local outlets, including wholesalers, local markets and also directly to consumers¹. Local market outlets include deliveries to the wholesale market (called *Cenada*) and sales at the open air markets (called *Ferías*). Whereas some producers are exclusively oriented to either the export or the local market, a significant number of farmers deliver to both market outlets, thus taking advantage of (seasonal) quality and price differences

The basic determinants of the buyers' selection and outlet choice are related to price and non-price attributes. The export market is a specialised market where quality, price and geographic location play an important role. The wholesale market is characterised by more flexibility in product administration and quality, where normally there are many buyers and sellers, and producers can easily meet other producers or an intermediary. Prices are mainly determined by supply, sometimes by previous agreements and also depend on quality characteristics of the mango.

The local open market (called *Feria*) is a similar outlet, but producers can usually get better prices because they sell small amounts and maintain contact with many buyers. For many smallholder producers this appears to be an attractive outlet, since many of them are sharecroppers and therefore have small amounts of different products to sell.

¹ The main quality criteria for rejection are related to external damage (appearance, black dots, bruises) and internal damage (fruit fly, rotten seed, among others), and are otherwise occasioned by the misuse of pesticides.

Intermediaries play a key actor in the process of local market differentiation. They buy the produce from farmers and deliver this to the Cenada-wholesale or the Feria market. In addition, they can buy rejected produce and leftovers from producers oriented at export markets and might sell this to retailers. Intermediaries thus possess much critical information about the mango sector and control transport facilities since they own their own trucks.

This paper analyses the factors that influence market differentiation between the export and local market in the mango sector of Costa Rica, and identifies the major determinants for differences in outlet choice. We first discuss the importance of price attributes, production systems organisation, farm household characteristics and market context for outlet choice decisions. Hereafter, we present our empirical survey on outlet choice decisions amongst a sample of 94 farmers in the major mango producing region (Central Pacific zone) of Costa Rica. We use a Tobit model and ANOVA analysis for the empirical analysis of the determinants of market outlet choice. Finally, we discuss the structural, institutional and behavioural factors that typically determine farmers' choice for a specific market channel orientation.

2. Factors influencing market outlet choice

Market outlet selection is a key task for everyone in the supply chain. Agents must find business partners who meet the minimum requirements of the market and the firm. The primary rationale for market segmentation is to identify the segments that are most interested in specific commodities and to focus marketing efforts on them in the most effective way (Jang *et al.*, 2002), Kotler (1999) defines market segmentation as the subdivision of a market into distinct subsets of customers, where any subset may conceivably be selected as a target market to be reached with a distinct marketing mix. Profitability and risk, variability and accessibility thus play a vital role in evaluating the attractiveness of each segment and selecting the best target market (McQueen and Miller, 1985; Jang *et al.*, 2002).

Traditional economic theories on comparative advantages have contributed significantly to an understanding of trade at a (inter)national level, but do not fully illuminate the forces driving major business between similar countries in the same industry (Brewer, 2001; Dunning, 1988). This incompleteness of the classical explanation of trade led to the behavioural school (Kay, 1993; Porter, 1990, among others), which asserts that within economic parameters, it is the judgement and decisions of firm managers that defines internationalisation and its consequences (Chetty and Holm, 2000 quoted by Brewer, 2001). It has been argued that firms are generally not entirely rational in international market selection and that market outlet choice is a very unpredictable, disjointed process (Toornoo, 1991).

From the evolutionary point of view, it is not the utility level that matters in market selection, but the chances of survival (Amir *et al.*, 2005). This evolutionary principle

leads to the consideration of the process of natural economic selection among participants, or among the market participants, or among the strategies of behaviour they adopt (Alchain, 1950; Enke, 1951; Penrose, 1952 quoted by Amir *et al.*, 2005). Morgan and Katsikeas (1997) have identified four sets of obstacles that explain why domestic firms are discouraged from exporting: strategic obstacles, operational and logistic obstacles, informational obstacles and process-based obstacles.

From the institutional economics point of view, Fafchamps (2004) explains that the allocation of resources can be organised in three different ways, via gift exchange (intra-household, with families and sometimes friends), market-oriented (based on reciprocity and pursuing self-interest) and through hierarchies (firms, government; relying on command and control). In a similar vein, we developed an analytical framework to explain the interactions between the institutional structure where market decisions are taken and the behavioural outcomes that result from the market selection (see Figure 1).

We systematically discuss the main component of this framework and identify appropriate operational definitions for each of the variables.

2.1. Farm household characteristics

Market outlet choice is likely to be influenced by farmers' risk attitude (Agarwal and Ramaswami, 1992). When actors face uncertainty, they will turn to others whom they know and trust (Galaskiewicz, 1985; Podolny, 1994). Baker (1994 quoted by

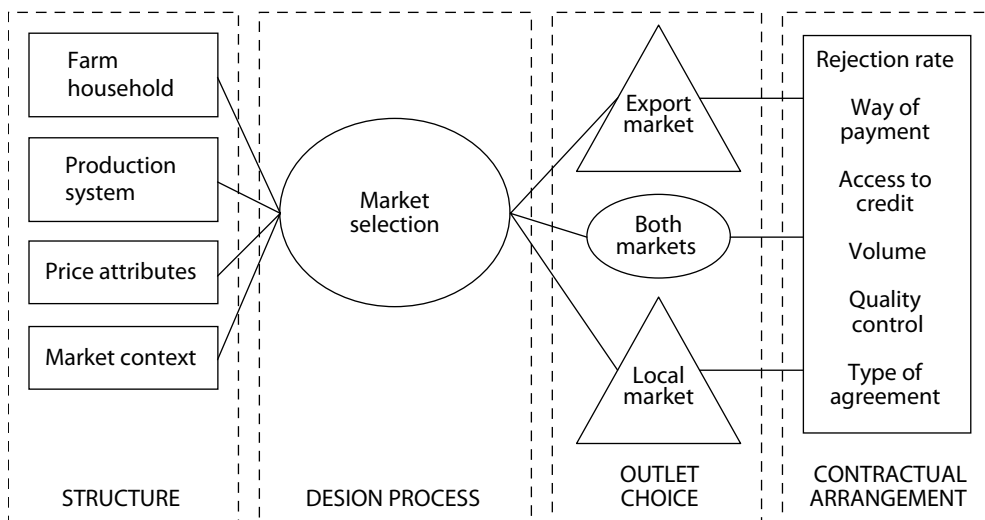


Figure 1. Analytical framework.

Tenbrunsel *et al.*, 1999) asserts that relationships are a fundamental human need, while Coleman (1988) argues that social context shapes, redirects and constrains a persons' actions. Personal relations seem to reduce prospects for opportunistic behaviour and moral hazard (Baker, 1990; Ben-Porath, 1980) and are likely to enhance cooperation (Granovetter, 1985). In the case of Costa Rican mango production, farmers select market outlets depending on their social network and background, and hence seek to reduce transaction costs and uncertainty, while on the other hand they feel safer in a market setting where they maintain long-term relationship with participating agents. In addition, Sáenz-Segura (2006) found that the location of production plots (proximity to the customers or buyers) defines the market outlet choice of the producer.

2.2. Production system

Agarwal and Ramaswami (1992) emphasised that potential sales (i.e. market size and growth rate) is an important business factor that influence market selection. Sáenz-Segura (2006) and Sáenz and Ruben (2004) found that scale of production and experience are positively related to the choice of export markets. Location-dependent costs arise from raw material acquisition and heterogeneous costs of operation at different sites (Rhim *et al.*, 2003). Ohyama *et al.* (2004), stress that an open economy regime creates a mechanism that selects new entrants in the order of their entrepreneurial abilities. This implies that more capable entrepreneurs run larger firms, and it is expected that early entering firms have a larger scale of production than later entrants under the open economy regime. Regardless of their type, older (mature) firms tend to have a larger size than new firms (Agarwal and Gort, 2002).

2.3. Price attributes

Price is usually considered as one of the most important attributes in the (neo-classical) analysis of economic regimes; in words of Williamson (2002) the chief mission of neoclassical economics is to understand how the price system coordinates the use of resource. Sáenz-Segura (2006) and Sáenz and Ruben (2004) found in Costa Rica that prices for products for the export market are higher than those for the national market. Most producers, including producers of mango, allocate part of their production to the domestic market for different reasons. First, to guarantee an alternative income source (flexibility), second to gain bargaining power (reducing the hold up) and in the third place to reduce the losses in production (reduction of risk and uncertainties). As asserted by Wilson (1986): 'Farmers rely on market diversification as a protective devise'. Whereas prices remain important for outlet choice, they are certainly not the only device and strategic factors may lead to a marketing mix based on different outlets.

2.4. Market context

Brewer (2001) describes three main factors for market selection, namely business factors, chance of success and physical distance. The chance of success factor is explained by Erramilli and Rao (1990) and Terpstra and Yu (1988) from the fact

that firms seek to follow competitors as well as clients into new markets. Hoang (1998) finds that small firms are usually more reactive than pro-active in market selection issues. Regarding physical distance, Driscoll and Paliwoda (1997) found that the socio-cultural distance between economic agents is important for entry mode choice without consideration of experience. Other authors, like Andersen and Buvik (2002) and Papadopolous and Denis (1988) explain, however, that physical distance often results in targeting markets close to the firm's immediate neighbours, since geographic proximity is likely to imply more knowledge about markets and guarantees easier access to information. On the other hand, many firms may not engage in exports, either because they do not have the necessary resources or they do not want to commit themselves (Christensen, 1991). Resource scarcity can restrict the ability of small firms to enter into the export market (Moen, 1999). Papadopoulos *et al.* (2002) identify demand potential and the trade barriers as major determinants for the market selection strategy followed by the firm. Demand potential is related to market similarity and consumer behaviour, and differentiates between substitute and complementary commodities. Trade barriers, both tariff and non tariff-barriers entrance barriers, together with geographic distance have implications for transaction costs. Hart and Holstrom (1987) and Chiarelli *et al.* (2002) state, however, that other purchase conditions such as terms of payment, provision of credit for inputs, frequency of delivery, seed, and technical assistance could enable producers to improve their product quality and thus influence their options for alternative market outlet choice. Sáenz-Segura (2006) and Sáenz and Ruben (2004), found indeed that in Costa Rica the availability of credit tends to increase the export orientation.

To summarise our understanding of the factors that influence market outlet choice as derived from the literature review, we present in Table 1 an overview of some main attributes that were found to be significant factors for internationalisation of activities in selected field studies. These variables will be also considered in our subsequent data analysis. We follow the analytical framework presented in Figure 1 by disaggregating the structural characteristics of the producer, the production system, the market context and the price regime that will affect the choice of the outlet by the producer (see Figure 1).

3. Materials and methods

The empirical material for the analysis of market outlet choice is derived from a representative survey amongst mango producers in the major production region of Costa Rica. The total sample included 94 farmers selected randomly selected from the producers' census for the Central Pacific zone (CPZ) of Costa Rica, performed by the National Production Bureau (CNP) in 2003. The census included data from 1500 producers. After cleaning the data and grouping the producers by area the valid number of observations was reduced to 861 producers. We used the census from 2003 to determine the appropriate sample size. To calculate the sample size the following formula was used:

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Table 1. Variables and dimensions of market outlet choice.

Dimension	Structural characteristics	Operational variables	Expected sign	Literature sources
Price attributes	price	average price (in colones)	↑	Saenz-Segura and Ruben (2004) Saenz-Segura (2006)
Production system	size	plot size (in ha.)	↑	Agarwal and Ramaswami (1992) Agarwal and Gort (2002)
	scale	mango production in boxes	↑	Saenz-Segura and Ruben (2004) Saenz-Segura (2006)
Farm-household characteristics	risk	producers' risk attitude	↑	Agarwal and Ramaswami(1992)
	experience	years of producing mango	↑	Saenz-Segura and Ruben (2004) Saenz-Segura (2006)
	trust	trust in buyers (1–10)	↑	Galaskiewicz (1985) Podolny (1994)
Market context	distance	distance to market, geographic location	↓	Brewer (2001) Driscoll and Paliwoda (1997)
	purchase condition	type of agreement, (1 none, 2 verbal, 3 written agreement)	↑	Papadopoulos <i>et al.</i> (2002) Chiarelli <i>et al.</i> (2002)

$$n_o = [(Z_{\alpha/2} \times \sigma) / d]^2 / \{1 + (1/N) \times [(Z_{\alpha/2} \times \sigma) / d]^2 - 1\}$$

where $Z_{\alpha/2}$ = Confidence Interval of 95% (1.96); σ = Standard Deviation of Population (10.86); d = permitted error (2); and N = Population size (861). After calculation, the appropriate sample size resulted in 101 producers. Hereafter, a correction formulae for finite populations was applied:

$$n = n_o / [1 + (n_o / N)]$$

The required sample size is 91 mango producers. Stratified random selection of producers was applied with assistance of extension agents of Agriculture and Livestock Ministry (MAG) and the CNP. Within the Central Pacific sub-regions, five areas were selected to conduct the survey: Orotina, San Mateo, Esparza, Garabito and Puntarenas (Central). Stratified sampling methods were used to define the amount of producers by location and actual sites. The total number of valid mango producer interviews was 94.

Data collection was based on a questionnaire amongst farmers regarding farm-household characteristics (i.e. family size, education, producers' age and experience, cultivated mango area) and production system characteristics (i.e. soil fertility, technical training, road condition, condition of the mango productive farm, if there where any tree stimulation by chemicals of physical treatment), followed by a series of interviews with producers to reveal their preferences regarding outlet choice and relationships with traders. We also collected detailed data on the type of delivery agreements (verbal or written), the payment procedures (cash, cheque), the rejection rate and the standing arrangements between buyers and sellers (e.g. plot inspection visits, quality control at the plot, credit delivery, etc.). Trust between producers and buyers was assessed through a Likert scale from 1 to 10, while risk attitudes measured also in a Likert scale from 1 to 10. Finally, some key market outlet characteristics (like the number of buyers, the years already attending the market, distance to market, price information and the degree of trust between seller and buyer) were included in the survey.

Data analysis has been conducted in two stages. First, an ANOVA analysis was performed to understand the main differences amongst agents delivering to certain market outlets. Second, a Tobit analysis was done to disentangle the attributes that differentiate market outlet choices. ANOVA analysis was used because we want to identify key differences between the economic agents that deliver to different outlets. For this purpose, ANOVA exhibits some advantage for analysing situations in which there are several independent variables, revealing how these independent variables interact with each other and what are the effects of these interactions on multiple market outlet choice as dependent variable (Field, 2002). Web relied on a Gabriel's *post hoc* procedure to check for significant differences among the different outlets, while considering different group size in the independent variable².

Based on the literature review, we selected a number of fixed producer characteristics for performing the Tobit analysis. As independent variable we used the percentage of production delivered to the export market in a range from 0 to 100. Tobit model resembles the Probit analysis, but the dependent variable is not binominal (0 or 1) but continuous. Tobit analysis is nowadays easy to perform due to its incorporation to several statistical packages, resembling in many features a linear regression procedure (Greene, 2003). We used STATA software for the data processing and analysis.

4. Results

The data analysis is divided in three parts. First, we performed an analysis at the level of the different agents (mango producers oriented to the export market, to the local market or to both markets) to understand the major intrinsic characteristics of farmers operating in each of the market segments. Second, we analyse the structural

² *Post hoc* test consist of pairwise comparisons that are designed to compare all different combinations of the treatment groups (Field, 2002).

factors that explain differences in outlet choices, using the results of the Tobit analysis. Thirdly, we provide a description of the factors that underpin the strategic interfaces between supply chain agents in the mango chain, paying particular attention to the Costa Rican chain configuration. The latter analysis is based on ANOVA tests.

4.1. Producers' characteristics and outlet choice

In order to characterise the different types of mango producers, we divided the sample population into three groups: export market-oriented (EM), local market-oriented (LM) and agents participating in both markets (BM). Table 2 present the results of the analysis of significant intrinsic differences between producers operating within each market segment.

There are few differences between farmers in terms of their farm household characteristics. Age of the producer, size of the farm and family size have no significant impact on outlet choice. Higher mango experience lead to preferences towards the local market, whereas farmers oriented towards export markets tend to possess less experience with mango production; this may be explained in part because exports of mango is rather recent in Costa Rica and mainly promoted under newly established plantations. Otherwise, education level has a positive relationship with export market orientation.

In terms of the production system characteristics, it is important to notice that export-oriented producers perceived to operate under more favourable weather conditions compared to producers delivering to the local market. Moreover, the former tend to follow more the advice from agricultural technicians, given the fact that strict maintenance of technical production procedures and general agricultural practices (like EurepGap) are of key importance for sustained access to export markets and retail outlets.

The price characteristics appear not to be significant different for market choice orientation. Producers input costs and output prices are fairly similar in different market channels, and thus major differences in delivery conditions are expected to be determined by non-price attributes, related to the market configuration and the characteristics of contractual arrangements.

With respect to the agreement characteristics, we find that access to the export market requires that the producer meets higher standards. Quality surveillance from the buyer at the plot is one of main differences among market outlets. Moreover, in terms of the associated contract characteristics for different outlets, written contracts are more frequently used in the export market, while cash payment are more common for the local market. In addition, producers delivering exclusively to export market have better access to credit. The major differentiation in market outlet choice thus appears to be related to the more demanding delivery conditions at the export market compared to the local market, that result in differences in production and marketing behaviour.

Table 2. Producer characteristics underlying market outlet choice.

Dimension	Variable	Difference EM - LM	Difference EM - BM	Difference BM - LM
Farm household characteristics	producers' age			
	producers' experience	*(-)		
	mango area			
	family size			
Production system characteristics	producers' education	**(+)		
	weather condition	*(+)		
	farm fertility			
	farm condition			
	tree stimulation			
	follow technical advice	*(+)		
	mango training			
Price characteristics	road condition			
	inputs cost			
Agreement characteristics	mango price			
	rejection rate	**(+)	***(+)	
	type of agreement	***(+)	***(+)	
	way of payment	***(+)		***(+)
	seller visits to buyer			
	buyer visits to seller	***(+)	***(+)	***(+)
	buyers' supervision in plot	***(+)	***(+)	
	quality control in the plot	***(+)	***(+)	
access to credit	***(+)			
Market characteristics	number of buyers	*(-)		*(-)
	years attending the market	***(-)		***(-)
	trust towards buyer			
	distance to market	**(-)	***(-)	
	mango dependency			
	knowledge on mango price			

Significance at *** 1%, ** 5%, * 10%, all other differences were not significant; + = positive relationship, - = negative relationship.

While it might be reasonable to expect that mango dependency will be higher for producers specialised in export market production, this appears not to be true; there are no significant differences between outlet orientation and mango income dependency. Otherwise, local market-oriented farmers can deal with more buyers and usually have attended the market for a longer period, thus being able to ample bargaining options. An important feature for export market-oriented producers is that they are located closer to the market. For integrated mango supply chains, the

nearby location of export processing facilities close to the plot provides incentive for prompt delivery and prevents free-riding. Note, however, that trust relationships with the buyers do not present any significant difference between the market channels, neither the knowledge about the mango price.

4.2. Mango export outlet choice selection

We proceeded with a more detailed analysis of the determinants of mango outlet choice, addressing the factors that influence deliveries to specific market segments. We used a Tobit regression model with the percentage delivery to the export market as the dependent variable (See Table 3). Results show that the significant explanatory variables include several *farm household* characteristics (mango experience and risk attitude), some dimensions of the *product system* (mango area, scale) and in the dimension *market context* conditions (purchase conditions, geographical location and distance to market). The constant is not significant and the adjusted R-square value is 0.277, indicating that the variance of the data is explained for 27%.

We analysed these results against the background of the structure of the mango market in Costa Rica (as discussed in Section 1) and considering the available theory regarding factors influencing market outlet choice (see Section 2).

Table 3. Structural factors determining export orientation (Tobit model).

	Coefficient	Std. Error	T Statistics	Probability	Significance
Farm household					
Mango experience (years)	-5.012	2.460	-2.04	0.044	**
Risk attitude (Likert 1 to 10)	-120.620	66.036	-1.83	0.071	*
Trust (Likert 1 to 10)	-11.870	8.999	-1.32	0.191	
Price attribute					
Average price (colon/box)	-0.009	0.020	-0.45	0.653	
Production system					
Mango Area (ha)	4.395	1.935	2.27	0.026	**
Scale of production (boxes/year)	0.001	0.001	2.22	0.029	**
Market context					
Purchase condition ¹	104.743	34.967	3.00	0.004	***
Geographical location ²	140.047	53.355	2.62	0.010	***
Distance to market (km)	-1.008	0.486	-2.07	0.041	**
Constant	-0.076	131.827	0.00	1.000	

Note: significance at *** 1%, ** 5%, * 10%; Adj. R² = 0.277; Number of obs = 94; LR Chi² = 53.05; Prob > Chi² = 0.00001; Pseudo R² = 0.1846.

¹1 no agreement, 2 verbal agreement, 3 written agreement.

²0 Alajuela, 1 Puntarenas

4.2.1. Farm household characteristics

Producers eligible for mango deliveries to the export market are usually strictly selected. We therefore expect from the literature that previous mango experience, risk-acceptance attitude and trust with the buyers would contribute to more export-orientation. Our results are, however, not fully consistent with the literature review. First, trust with the buyers appears not to be significant in our research. Galaskiewicz (1985) and Podolny (1994) already stressed that trust in business partners is a key determinant for internationalisation of supply chains. In the case of mango from Costa Rica, trust may be of less importance for market outlet selection, since most agents involved in the transactions do only know each other recently and business relationships are still limited to short-run deliveries with no clear perspective for long run arrangements. In addition, there is a clear lack of information regarding the reputation of agents and hence the uncertainty in transactions is relatively; agents are more likely to search for arrangements that safeguard the delivery and may rely on interlinked transactions (i.e. input credit and technical assistance) to avoid opportunistic behaviour and moral hazards.

With respect to risk attitudes, Agarwal and Ramaswami (1992) found that risk-taking agents are usually better able to enter export markets. In our research, the farmers' risk attitude is significant, but the direction of the sign is opposite: risk-averse agents are more likely to deliver to the export market. This seems to be a counter-intuitive result, but it is worthy to mention that producers who are delivering to the export market at this moment in Costa Rica to a certain extent play the safe position by reducing transaction costs and delivering to the market outlet that is closest to their plot, even if they have to comply with more requirement for acceding such an outlet.

Experience in the crop production also appears to be important to be able to enter the export market, but for the case of mango experience has a negative sign, implying that less-experienced agents are better able to engage with the export market. Saenz-Segura (2006) and Saenz-Segura and Ruben (2004) found a similar relationship, and explained this by referring to the fact that mango exports from Costa Rica are a rather new activity and that—given the shift to new mango varieties—it is easier for new (but less experienced) producers to adopt the production system that are required for export production. Established producers are thus more likely to deliver to the local market, and are equally less risk-averse given the local market selling options.

4.2.2. Production system

The variables cultivated mango area and scale of production have a positive relationship with export market orientation, in line with the findings from literature (e.g. Agarwal and Ramaswami, 1992; Agarwal and Gort, 2002; Saenz-Segura and Ruben, 2004). Larger mango areas increase the possibilities for producers to deliver to the export market segment, and likewise a higher scale of production (more boxes per week) tends to facilitate the entrance to the export market. From the institutional point of view,

it is important for the buyer to contract with a limited number of larger producers, thus reducing the monitoring and control cost as well as the delivery uncertainties. As pointed out by Key and Runsten (1999), business relations between large companies or vertical integration of processes are common procedures for reducing transaction cost associated with uncertainty (quality, control and monitoring).

4.2.3. Price attributes

Price differences seem to have limited implications for the market outlet choice, since mango producers are mostly price takers and are not able to influence prices that are out of their control. Mango prices in Costa Rica are based on the international baseline price provided by the importers to the local producers and the bottom price they receive in the local market. This price transmission mechanism is especially valid for the period between January and May when the mango export window is open for Costa Rica. Mango prices are also dependent on other fruit categories, since (local) consumers are willing to substitute between mango varieties and with other tropical fruits depending on seasonal availability.

4.2.4. Market context

From the institutional point of view, purchase conditions that are related to market entry barriers as well as to contract requirements are of critical importance for entering the export market (Key and Runsten, 1999; Papadopoulos *et al.*, 2002; Chiarelli *et al.*, 2000). Farmers that are better able to comply with the demanding market conditions will become engaged with export outlets. In the case of Costa Rican mango sector, export producers are agents that are willing and able to bear more demanding and stricter delivery conditions for entering the market. In addition, distance to the market where mango is collected enables better quality control and reduced degradation. It is important to notice that for being able to improve the production systems oriented towards the export market, farmers require to construct recollection facilities close to their production areas.

In Costa Rica, mango production for the export market is based in Puntarenas (northern part of the country), while production for the local market is mainly located in Alajuela (Central part of the country). Hence, export market collectors and packaging facilities are closer to the mango producers in the northern part of the country, whereas producers delivering to the local market must travel longer distances to get access to the local markets located mainly in the Central Valley where most of the population is concentrated.

Purchase conditions for the mango export oriented are different to those for the local market oriented. The quality standards are stricter as well as the contract characteristics such as contract type, way of payment, rejection rate bearing and supervision by the buyer in the plot. Normally, the exporter oriented will bear more rejection in the selection and packing process and will have to face written contracts and less flexibility

in its selling strategy. Local market oriented producers have less requirements to meet customer needs and have a more flexible selling strategy.

4.3. Differentiation within mango supply chains

Finally, we discuss the behavioural attributes that give rise to differentiation within the mango supply chain. Therefore, we used ANOVA analysis to identify the contractual delivery conditions that prevail in transactions between the different actors in the chain. Table 4 presents a summary diagram showing the main factors affecting the delivery conditions at the interfaces between major market agents.

Major differences between the delivery conditions at the wholesale (Cenada) and retail (Feria) market refer to the larger number of available buyers and the better availability of price information at the latter market. This implies that local retail outlets provide more bargaining opportunities for producers. For deliveries to the wholesale market, producers must travel longer distances, but they receive direct cash payments from buyers and are not bothered by buyer that want to inspect their plots. At this interface, rejection rates might be higher, but options for selling a larger volume and the absence of delayed payment risks may make wholesale delivery an attractive options, particularly for larger producers. The main difference between wholesale and export outlets refer to the latter outlet implies more complex delivery agreement, payments in cheques, and more field supervision and quality control, but also opportunities for additional access to input credit as part of an interlinked contract.

Delivery conditions at retailers differentiate from those with intermediaries with respect to the larger number of buyers, greater distance to the market and the longer period attending the market that result in a the lower rejection rate, direct cash payment and more knowledge about prices but less information on the production conditions for deliveries at the Feria. Retail sales can be expected to be attractive for producers that offer standard mango quality and prefer prompt sales with too much risk. Otherwise, sales to intermediaries is likely to be preferred by producers with above-average mango quality that are able to sell the rejected volumes through alternative market outlets.

Delivery modes at the export market are mainly based on the contractual arrangements where the producers is willing to bear more stringent conditions in order to get access to export outlets. Given their remote location, most of these producers only have limited alternative options. In case they do not agree to sell to the export agency, they have to face high transport costs to reach other outlets or elsewhere deliver to intermediaries that will pay a substantially lower prices for the mangoes compared to the export market. Major differences between the intermediary and the exporter refer to the more complex delivery requirements and the higher quality control that are effective at the export market segment.

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Table 4. Delivery procedures at supply chain interfaces (ANOVA analysis).

	Wholesaler	Retailer	Intermediary	Exporter
Wholesaler		(-) number of buyers (-) price knowledge	(-) way of payment (+) distance to market (-) buyer visit the plot	(+) years attending the market (-) type of agreement (-) way of payment (-) buyer visit the plot (-) supervision by the buyer (-) quality control (-) access to credit
Retailer			(+) number of buyers (+) years attending the market (-) rejection rate (-) way of payment (+) distance to market (+) price knowledge (-) buyer visit the plot	(+) number of buyers (+) years attending the market (-) rejection rate (-) type of agreement (-) way of payment (+) distance to market (-) buyer visit the plot (-) supervision by the buyer (-) quality control (-) access to credit
Intermediary				(-) rejection rate (-) type of agreement (-) buyer visit the plot (-) supervision by the buyer (-) quality control (-) access to credit
Exporter				

5. Discussion and conclusion

Mango market outlet selection is a strategic decision of producers, which have to decide on their market portfolio mix in terms of maximising their (family) welfare and guaranteeing their strategic market position. Since price differences between local and export markets are not substantial, other market delivery conditions related

to guaranteed and stable access and potential cost advantages tend to be of higher importance. While deliveries to the export market might be attractive if producers can benefit from reduced transport and transaction costs, they also incur higher input costs, have to face higher rejection rates and must pay fees for their EurepGap certification. This implies that all production activities should be registered and that producers lose their independency, since they should accept *in-situ* inspections. Given these requirements, many producers moved to the local market because they were unable to meet the certification requirements.

Summarising our findings, we can outline the mango supply chain configuration and the differences in outlet choice (see Figure 2). It is important to notice that for the export market the vertical integration processes is already advanced: producers deliver on demand of the buyer and therefore face higher rejection rate, but in compensation they get access to stable market outlets, receive input and (subsidised) credit and benefit from lower transport and delivery costs. For the local market, the producers' experience and his historical knowledge and relationships with the market are of key importance. In addition, the flexibility to sell to a large number of different clients, the cash payments and the reduced possibilities of hold-up may make this a preferred market outlet. Sales to intermediaries that live close to the producer and visit the producer often to see whether rejected mango can be bought provide an important secondary market outlet. Since local market are less strict with respect to quality (but nevertheless control for colour and maturity) intermediaries purchase mangoes that are riper than those delivered to the export market. However, intermediaries buying mango usually pay one week later (after having sold the produce) and therefore they built on an established relationship with the producer, while for Cenada and Feria sales spot market transactions are the rule.

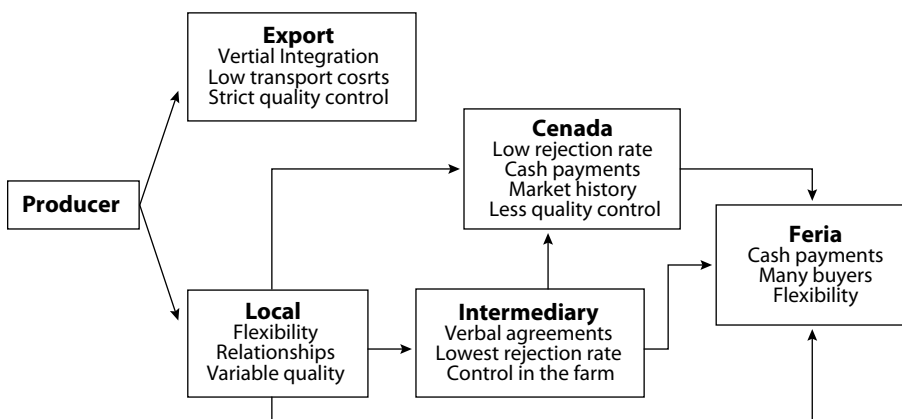


Figure 2. differentiation in mango outlet choices.

Given the variability in prices (at local and export markets) and the additional differences in production conditions (input and credit costs) and supply conditions (rejection rate), market outlet choice is a complex decision involving both welfare objectives and risk and transaction costs considerations. Even while producers delivering to the local market at the Feria might perceive sometimes higher prices, they also face higher costs for delivering their mangoes to this outlet, and they need specific skills and knowledge to guarantee successful operations. Building such reputation and trust requires particular experience that asks for a long-term engagement. Otherwise, direct cash payments at the retail and wholesale market tend to reduce risks. The operations of local intermediaries are somewhat closer to the producer and enable deliveries of rejected produce to an alternative market outlet. The plot inspections by intermediaries are therefore less related to quality control and have far more to do with availability control. Compared to exporters, intermediaries face major financial constraints for direct payments, and usually take advantage of opportunisms in their pricing policy.

Producers delivering to the export market have to bear more stringent delivery conditions defined by the buyer. Export market chains are moving into the direction of vertically integrated processes. Given the risk involved in mango production, exporters will contract with producers instead of engaging in production themselves. Export contracts are mainly arranged with medium-scale and larger mango plantations that use up-to-date procedures and cultivate modern varieties, while located close to the processing plants. In the export chain, producers are the least informed about market conditions and opportunities, and are basically preoccupied with upgrading of primary production. Traders and intermediaries are the best informed agent in the chain, since through their logistic operations they link the production and marketing part of the chain.

Further research would be required to obtain detailed information on the production function for different market outlets. It is also important to determine the market mix of the producers to be able to understand their multiple market orientation. Both aspects could provide further information on the backwards implications of market outlet choice for the strategic behaviour of mango producers.

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Meeting and beating market requirements: competing in the big league

Sabine Willems

Abstract

Pineapple export to European markets has been a flourishing business for numerous small-holders in Ivory Coast for a number of decades. Until the mid 1990s, the Ivorian producers have benefited from a monopoly position at the European pineapple market. This situation changed, however, after companies such as Dole and Del Monte with plantations in Central and South America penetrated the European market with a new pineapple variety, the MD-2 pineapple. With the introduction of this new pineapple variety, the predominantly small-scale pineapple producers of Ivory Coast were also confronted with increased competition from highly organised transnational companies (TNCs) and increasingly stringent market requirements. This chapter shows the battle of the Ivorian pineapple sector to meet and beat these new market conditions in order to remain competitive in the European pineapple market.

1. Introduction

The annual export volume of fresh pineapples from Ivory Coast to the European markets has increased considerably between the mid 1970s and the mid 1980s, with a peak export season in 1986 (193,775 tons). During this period, Ivory Coast accounted for 95% of the fresh pineapple market in Europe (OCAB, 2003). This period clearly represents a period in which Ivorian pineapple growers flourished; because the European market held such promise, large numbers of producers became involved in pineapple production.

2. Position of Ivory Coast in the global pineapple sector

However, as a result of increased competition from countries in Central and South America, such as Costa Rica, Honduras and the Dominican Republic, this picture changed in the early 1990s. The competition came in particular from transnational companies (TNCs) such as Del Monte and Dole, which strongly penetrated European pineapple markets. As a result, the market share held by Ivory Coast dropped considerably and accounted for just a little more than 50% of total European imports in the mid 1990s (OCAB, 2003). During the same period, the share of pineapples from Central and South American countries in the European market rose from close to zero to almost 30% (Loeillet, 1997). The Ivorian pineapple sector, under the

guidance of the Ivorian overall pineapple export organisation ‘Organisation Centrale des Producteurs - Exportateurs d’Ananas et de Bananes (OCAB)’, realised that it had to increase the quality of pineapples (homogeneity of colour, size and taste) and to lower sea transportation costs in order to maintain the Ivorian market share in the European market.

When viewing this quite dramatic changeover, the question arises: how were these transnational companies able to conquer the European pineapple market? The main reason for this was that these TNCs are able to offer a homogeneous product of high quality, profiting from their highly organised production system, planning and export structure and using modern ICT applications. The TNCs control the entire supply chain from cultivation to marketing, with little intervention from third parties. In order to ensure a high quality and homogeneous product, large investments have been made in technology, research and streamlined organisation. Also, their pineapples are traded under well-known brand names that are recognised by consumers as a guarantee for high quality fruit, which is further stimulated through promotional campaigns. Obviously, the investment required for such a comprehensive approach is only viable for large companies like Dole and Del Monte. These companies have therewith become powerful actors in the global pineapple setting.

Ivorian exporters are not yet in a position to offer the same level of quality, homogeneity and marketing efforts. This is not only due to the capital requirements, but also because their production system consists of multiple producers, mostly small-scale, who use different production techniques, resulting in heterogeneous products and varying quality. Ivorian pineapples are furthermore traded under many different brand names, by many different importers, which limits opportunities for effective (large-scale) promotional campaigns. The Ivorian pineapple sector has thus not yet been able to organise its production or to control processes at the same level as the TNCs with whom they compete. This has seriously weakened their position in the global marketplace.

Nevertheless, until 1996, Ivorian pineapples (the Cayenne Lisse variety) had several important advantages over Central American pineapples, among which were colour and taste, two very important marketing factors. In that period, most pineapples from Central and South America were of the green ‘Champaka’ variety (dark green external coloration when ripe) and had less aroma than pineapples from Africa (Loeillet, 2003; COLEACP, 2002). In the early 1990s, the TNCs started huge campaigns to promote their green variety in the European market, homing in on a rising consumer appreciation of ‘natural’ and ‘organic’ aspects of agricultural products; green pineapples were associated with these aspects. These pineapples from South and Central America flooded the European market during this period, as a result of which market prices dropped enormously. Despite these efforts and considering the many advantages of the South and Central American production (see Table 1), the green pineapple never really penetrated in the European markets, since European consumers remained attracted to yellow coloured pineapple.

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Table 1. Advantages and disadvantages of pineapple production in Africa and Central America for the European market before 1996 (Jexco Queyrane Conseil, 1998).

	Africa	South and Central America
Advantages	taste colour cultural and economical ties with Europe shorter distance favourable reputation	homogeneous product transnational export structures large-scale, professional producers commercial strategies modern ict applications an integrated production high cultivation techniques lower production costs good infrastructure owner of sea transport
Disadvantages	high production costs many different production systems many small-scale producers low or moderate cultivation techniques many different export organisations heterogeneous product bad infrastructure at farms	taste colour distance

The launch of Del Monte's new hybrid variety MD-2 in 1996, a yellow sweet pineapple, with the new brand name 'Del Monte Gold', however, dramatically changed this situation. Del Monte Gold is coined as the new label of Del Monte and has been rewriting the pineapple business every since, beating the Cayenne Lisse variety which had been the backbone of the global pineapple industry for more than a century. Until the introduction of the MD-2 variety, the global pineapple industry had relied almost entirely on this single variety, for both processing and fresh production, a monopoly largely due to its high yield, adaptability to different conditions and good characteristics for canning. However, the narrow genetic base has made the variety vulnerable to the threat of pests and diseases (Chan *et al.*, 2003).

With the development of the MD-2 variety, the deficiencies of the earlier green pineapple had been overcome, and a good alternative for existing popular varieties such as the Cayenne Lisse is now available. A strong competitor arose; one that is by all accounts equal to or better than the current varieties. Compared to the Cayenne Lisse, the MD-2 has an intense orange-yellow colour, high sugar content, high Vitamin C content, low acidity, a good texture and is generally smaller in size. According to Chan *et al.* (2003), the new variety is also resistant to internal browning and is more productive than the Cayenne Lisse. The investments and efforts of Del Monte are clearly paying off; according to Danielou and Ravry (2005), the high value strategy of Del Monte has



Figure 1. The 'Golden' and 'Super Sweet' rush of pineapple brand names.

resulted in net profit margins of 25 to 30% on Del Monte's pineapple lines. Building upon this success, it is expected that Del Monte will launch a second new pineapple variety under the name 'Del Monte Honey Gold' in 2006, aiming to capitalise on the growing international demand for pineapples (Danielou and Ravry, 2005).

Undoubtedly, Del Monte is benefiting greatly from the popularity of the MD-2 pineapple and is rapidly gaining significant market share of the European market, thanks to superior promotion and marketing campaigns. Other TNCs, such as Dole, Compagnie Fruitière and Chiquita follow closely in their footsteps by switching over to the new variety³ or by inventing new varieties. As a result, the MD-2 variety is nowadays not only applied in Central and South America but has spread to other large-scale pineapple producing areas. The introduction of the Del Monte Gold pineapple has thus, with 'Golden' and 'Super Sweet' pineapple brands flooding international markets (see Figure 1): Chiquita has launched the 'Chiquita Gold Extra Sweet Pineapple', Dole the 'Dole Premium Select Super Sweet Pineapple Tropical Gold' and Bonita the 'Bonita Sunripe Ultra Sweet Pineapple' (Loeillet, 2003).

For small-scale farmers, however, these changes are much more difficult. Their production and processing techniques have been specially adapted to a particular variety, mostly Cayenne Lisse. A change to MD-2 would involve considerable investment in new technology. For example, where shoots from existing plants are used to grow new plants from traditional varieties, the MD-2 variety requires the application of in-vitro techniques. In particular small-scale pineapple producers such as in Ivory Coast are unable or would hesitate to shift to MD-2 due to the high costs involved.

³ The MD-2 variety is not a proprietary cultivar exclusive to the Del Monte company, but the company has patented the breed. Even the latter, however, is being disputed by Del Monte's competitors. Conflicts, in cases resulting in law suits, between the companies have and are presently ongoing. For example, the Produce News (2000) published an article on a recent lawsuit of Del Monte Fresh Produce Co. who sued its rival Dole Food Co. in 2000 on the claim that Dole's new extra-sweet pineapple brand-'Premium Select' - was based on plant material taken unlawfully from a Del Monte pineapple plantation in Costa Rica (Wright, 2000).

Nevertheless, as stated in Table 1, the African pineapple traditionally had other important advantages, next to its taste and colour, including the smaller logistical distance to Europe, and related lower transportation costs. Such disadvantages were, however, largely overcome by the powerful TNCs which implemented up-to-date production and transportation technologies. Furthermore, TNCs established their own plantations, or bought shares in existing plantations, on African ground (although the majority of production of fresh pineapples by these TNCs still takes place in Central and South America). These large companies started to dominate the European fresh pineapple market by closing deals with large European buyers (see Box 1), thereby overthrowing, along the way, long-term incumbent suppliers, amongst which are Ivory Coast's pineapple producers (Amanor-Boadu *et al.*, 2002).

Box 1. The case of a Dutch fruit importer who changed from West-African pineapples to produce of Del Monte (Interview with Bakker Barendrecht, April 2002).

The Dutch fruit importer Bakker Barendrecht supplies pineapples to the largest Dutch retailer Albert Heijn. Until 2000, Bakker Barendrecht imported its pineapples mainly from West Africa. The person in charge of the purchase of pineapples warned some African pineapple producers of the success of the Del Monte Gold pineapple and advised these producers to change their pineapple varieties Cayenne Lisse and Queen into MD-2 since the Del Monte Gold pineapple is of a better quality. According to this buyer, the Del Monte Gold pineapple has a longer shelf life and shows rotten spots at the skin when the fruit turns old. He experienced that the skin of the variety Cayenne Lisse does not show rotten spots when the internal flesh is starting to rot. Consumers therefore believe that the pineapple is still fresh and become very disappointed when they find out that the inside is rotten. Also, the taste of the Del Monte Gold pineapple is very sweet, although the Bakker Barendrecht pineapple buyer argues that it may even be too sweet and that he therefore personally prefers the taste of the Cayenne Lisse pineapple.

In 2000, Albert Heijn and Bakker Barendrecht therefore decided to shift to Del Monte Gold pineapples because of the high quality, the guaranteed supply of homogeneous fruits and the superior logistical services of Del Monte. Consequently, their import of African pineapples stopped almost entirely*. A Dutch agent of Del Monte is taking care of the logistical aspects of the import of the Del Monte pineapples. Bakker Barendrecht receives the pineapples from this agent. Problems with the pineapples are reported back to the agent. Albert Heijn also has direct contacts with Del Monte concerning quality and food safety issues, the yearly supply of pineapples and price issues. At the time when Bakker Barendrecht was still importing pineapples from West Africa, they had to organise the contacts with the African producers and the transport of the fruits

to the Netherlands themselves. Managing issues such as quality, food safety and price and delivery guarantees were consequently much more difficult.

* It should be noted, however, that the mother company of Albert Heijn, Royal Ahold, started a development program to support small-holders with the establishment of sustainable trade relations in Ghana in 2002. Pineapple are one of the sectors that Royal Ahold is supporting. The focus of Royal Ahold is mainly on the introduction of the MD-2 variety and on fair trade and organic pineapples. Royal Ahold's Program Manager of Ghana has insisted that Royal Ahold has no direct commercial intentions in Ghana, although the company may source products from Ghana once producers and companies have proven to be reliable suppliers (Interview with the Royal Ahold's Manager of Ghana, September 2003). Generally, however, Royal Ahold's support to Ghana should be seen as a demonstration of the company's Corporate Social Responsibility program.

3. Consumer awareness or deception?

The long-standing position of traditional pineapple varieties, most importantly the Cayenne Lisse, is remarkable within the light of global trends in commodity development and diversification, under the influence of consumer awareness. Consumer concerns and trends may have great impact on the market opportunities of agricultural fresh produce. In present times, consumer's demand is changing rapidly especially in the fresh produce sector. An accurate response to these trends is necessary in order to maintain market position. Producers and traders therefore need to be innovative and add value to their products to profit from the developments that open up new market segments. As Vincenzo Tassinari, CEO COOP Italy, argues 'producers who fail to differentiate or offer real value to the consumer will diminish greatly' (cited in: Grievink *et al.*, 2002: 95).

As shown by Chan *et al.* (2003), breeding and research programs in the pineapple sector over the years have not been able to produce new varieties that differ significantly from native types, or provide worthy improvements. Consequently, until the introduction of the MD-2 in 1996, the global pineapple industry had relied almost entirely on the Cayenne Lisse variety. Until that time, innovations in the pineapple sector have been restricted to a few diversifications to the existing varieties. For instance, chilled fresh-cut pineapples packed as spears or chunks in sealed plastic bags for retail sale (Rohrbach *et al.*, 2003). Following the breakthrough of the new hybrid variety introduced by Del Monte, other companies also switched over to this new variety. It is interesting to look into the actual factors behind the success of this new pineapple variety, as a case study, to gain insight in the multiple facets involved in such global processes, including the role of consumers and other actors.

As argued earlier, with the introduction of the MD-2 variety, a new pineapple with superior characteristics has been introduced to the market. The benefits of the new

variety in terms of quality, yield, and costs are clear, however, a question that should be asked is: to what extent do consumers actually play a role in the success rate of the new variety? The introduction of the MD-2 pineapple, the Del Monte Gold, was preceded by an in-depth study on consumer behaviour in Europe. The study showed that the European consumer is in favour of a bright yellow-coloured pineapple (Eurofruit, 1996). However, a recent independent study by Agrotechnology and Food Innovations B.V. of 405 consumers in eight European countries⁴ on preference for the MD-2 over the Cayenne Lisse pineapple, as reported by Sefa-Dedeh (2005), shows that there is no significant difference in consumer choice between the two varieties. Apart from a small preference for the MD-2 variety in the Netherlands, and for the Cayenne Lisse variety in Sweden, consumers showed no clear preference for either variety. Unfortunately, thus far little further study on this topic has been published. Nevertheless, its results make us suspect that consumer preference alone can probably not explain the success of the new pineapple variety.

If indeed the consumer's taste does not solely explain the success of the MD-2 variety, then what other factors have been determinant? The answer is probably multi-fold, but may be largely explained by the strong position of the large-scale suppliers, mainly TNCs, and the retail sector. As a starting point, it should be noted that the development of the new pineapple variety would most probably not have come to being without the enormous consolidation process that has taken place in the pineapple and other fresh fruit sectors: the establishment and growth of TNCs and other large-scale companies has strongly boosted development and innovation in the sector, which traditionally was too fragmented to allow for the level of investment in research, technological development, and marketing required for the development and introduction of the new variety. From the foregoing, the benefits to the supplier, mostly a TNC, are clear: a product which is better in quality to existing varieties, can be produced homogeneously, and has a higher profit margin. With the new variety, the TNCs are now able to offer a competitive product.

The benefits to the retail sector are also clear, as demonstrated by for example the case presented in Box 1. It should be noted that the fresh produce department in supermarkets is growing because of an increase in demand for such commodities. Promotion of fresh produce has become a key component of the retailer's strategy to attract and build loyalty in consumers (Weatherspoon *et al.*, 2002). With a market share of around 80% of total fresh produce retail sales, supermarkets nowadays account for the majority of fruit and vegetable retail sales in Western Europe (Rabobank International, 2002), the majority of which is in the hands of few large-scale retailers. In the UK, it was estimated that the six largest food retailers had already captured a 76% share of fruit and vegetable sales by 1997 (Fearne and Hughes, 1998). From interviews with a number of European retailers and importers in 2003, it has become clear that many of them tend to prefer to deal with globally operating

⁴ These countries were the Netherlands, France, United Kingdom, Italy, Sweden, Switzerland, Germany and Spain.

companies because of the services offered by these companies (Willems *et al.*, 2004)⁵. Dole, for instance, provides a full range of fresh products and customer services to maximise sales and profits for both the retailer and Dole. On a regular basis, the company introduces new products and, furthermore, offers a strong global brand, state-of-the-art transportation services, a global distribution network, low-cost production capabilities, and last but not least huge trade promotion activities (Dole, 2003). With regard to the latter, TNCs like Del Monte and Dole promote their own products, which is hardly the case for more individualised suppliers.

An important factor is also the increased attention to food safety and quality. In an interview with the Director of Del Monte in the Netherlands, he argued that Del Monte's safety and quality requirements go beyond those stipulated by supermarkets. The company is well aware that consumers buy their products because they link their brand with food quality and safety. To assure the confidence of consumers in their brand, food safety and quality are the company's highest priority, and it therefore strives to control the whole supply chain and therewith guarantee safe and high quality products⁶.

As is clear from Box 1, the benefits to retailers switching over to TNCs rather than individual suppliers are therefore large, and many have taken this step. It is probably this fact that has been the key factor in the successful introduction of the MD-2 variety in the market. The TNCs marketing strategies are strongly geared towards both consumers and retailers. It is this approach that has generated a firm image and strong buyer interest in the MD-2, and which has enabled Del Monte to penetrate many parts of the European market with their new variety; even in France which is the leading market for pineapple consumption and is traditionally dominated by pineapples from Ivory Coast (Eurofruit, 1996). This trend has also been demonstrated by Leyden (2003) who conducted a survey among major buyers of fresh produce in the United Kingdom. She concludes that although the major UK supermarkets source different pineapple varieties, Del Monte has largely convinced them that the MD-2 is the future.

Nevertheless, despite all the advantages to retailers and consumers, the level of success of the introduction of the MD-2 variety remains remarkable, in particular when considering that the market price for a MD-2 pineapple initially was up to two times higher than, for example, the Cayenne Lisse. According to the Wall Street Journal (Frank, 2003), Del Monte's price for the MD-2 is as high as US\$ 20 for a 25-pound box, which usually hold 5 to 7 pineapples. This is confirmed by a Dutch importer of pineapples who indicated that the price of a 12 kilo box of MD-2 pineapples cost 19

⁵ A study conducted for the project 'Food Safety and Agricultural Health Standards: Challenges and Opportunities for Developing Country Exports' for the Poverty Reduction and Economic Management Trade Unit and Agriculture and Rural Development Department of the World Bank.

⁶ Interview with the Director of Del Monte in the Netherlands, May 2003.

Euro in April 2002. At the same time, a similar box of Cayenne Lisse pineapples cost 9 Euro⁷.

Although from the foregoing it may be argued that the success of the introduction of the MD-2 variety pineapple has been largely driven by the retail sector and TNCs, it should be noted, that an important driver behind the process of consolidation and increase in power by these sectors has actually been the globalisation and individualisation of consumer trends. The latter has led to consumers who are more concerned about issues such as safety, quality, and health aspects but also about aspects like animal welfare, environmental friendly or organic products and social elements such as working conditions, salaries of employees, etc. As also shown by Marsden *et al.* (2000), retailers have translated consumer interest into the demand for a transparent supply chain to trace back the product upstream the chain. This, in turn, has led to increased power in the retail sector: growing consumer concern regarding certain issues has granted retailer's bargaining power within supply chains to act as protectors of consumers' interests; in the process they act as a kind of legislator. In this respect, special attention is given to fresh products for which transparency of the supply chain is becoming more and more important. As a result, the retailer imposes quality and safety standards on producers. In turn, such standards can only be met by a well-organised producer/suppliers, with access to the required technology, organisational setting and sufficient capital for the necessary investment; hence, a boost for the TNCs.

Within the context of the above, it should also be noted that until the mid 1990s, the characteristics of the TNCs (well organised, control over the supply chain, etc.) had not provided them with a competitive advantage in the European fresh pineapple market. It can be noted, however, that until early 1990, the European fresh pineapple markets had also not been the focus for TNCs such as Dole and Del Monte. Moreover, the launch of the MD-2 variety came at a time when other issues such as food safety but also branding became important topics for European retailers. As shown earlier, TNCs were able to respond adequately to the increasing food safety concerns of the retailers, which became important players in the fresh produce market and launched huge promotional campaigns to attract consumers' as well as retailers' attention for their products. Within the context of the above, it should be noted that consumers are mostly unaware of the complexity of choices made by retailers or whether the criteria used for such choices match their interests.

4. Features of the pineapple sector in Ivory Coast

To understand the Ivorian reaction to the growing international competition, this section starts with a quick historical overview of the development of the Ivorian pineapple.

⁷ Interview with a Dutch importer of pineapples, April 2002.

The pineapple was introduced in Ivory Coast by French colonists in the early 20th century, as a commercial enterprise for their home markets. The colonists established well organised administrative, production and distribution systems to enhance the production and export of the fruit. From the 1940s onwards, cooperatives and associations were established to support the pineapple producers with the production of the pineapple and the coordination of the export of the fruit. After Independence in 1960, the Ivorian government continued to support the sector through the establishment of a sector-wide organisational set-up, the mobilisation of international financial support (e.g. for investment and research), the flow of cheap labour that the state facilitated through its open-door immigration policy and the state's land policy of 'land belongs to those who cultivate it' (including for migrants). These interventions have enhanced the development of the pineapple sector and have contributed to the leading position of Ivory Coast in the European pineapple market.

The establishment of OCAB in 1991 as the sector-wide organisation for pineapple and banana producers and exporters, representing all export organisations and the large majority of large, medium and small-scale producers, provides the Ivorian pineapple sector with a strong mechanism for collective action, and an effective tool for constructing order in this highly diverse sector. OCAB only deals with formally registered export organisations such as associations, cooperatives and civil agricultural society. Representatives of these export organisations are board members of OCAB. Sea transportation has always been the strong-hold of OCAB: Since there are no alternative regular reefer lines operating between Ivory Coast and Europe, most producers are obliged to export their pineapples through one of the member export organisations of OCAB.

The increased competition from pineapples of Central and South America made members of OCAB realise that the sector had to make drastic changes in order to prevent further loss of market share. They decided, through OCAB, to tackle two major issues that affected, in their view, the competitive position of the Ivorian pineapple over the Central and South American pineapple, namely the lowering of sea transport costs (and thus significantly reducing the total cost of the fruit in the markets), and the increase in the quality and homogeneity of the pineapples.

Sea transport has always been the main means of transport of fresh pineapples from Ivory Coast to Europe (mainly to France). The French colonists had set up regular shipping lines to guarantee a continuous flow of commodities between the French colonies and their homeland. Originally, the French shipping company Delmas was in charge of the sea transport. In 1968, however, the Ivorian government created Sitram ('la Société Ivoirienne de Transport Maritime') and therewith broke open the French monopoly on activities in the sea transport sector. Sitram acted as a freight company and was responsible for all activities in the harbour, made sure the correct export papers were obtained and arranged the contracts with the shipping agency. For a long time, Sitram and Delmas were the only companies that were involved in organisation of the export of bananas and pineapples and therefore held a monopoly position. Sea

freight costs were high, at US\$ 118 per pallet. A study by OCAB, executed in 1991, demonstrated that the sea freight costs could be as low as US\$ 72 per pallet, a result causing quite some disturbance among the producers. It took eventually until March 1996 for the Ivorian government to fully liberalise sea transport, finally ending the monopoly of Sitram (Jexco Queyrane Conseil, 1998; OCAB, 1996). Consequently, through the active interventions by OCAB, the average sea freight costs were lowered to US\$ 80 for Marseille and US\$ 89 per pallet to the harbour of Dieppe⁸. The negotiated liberalisation of the sea transport had thus led to a substantial decrease in transport costs, the highest cost factor in the production-export process.

To minimise the sea freight costs, OCAB's members have established a system whereby producers have to predict, in advance, the expected number of pallets to be exported on any particular date. Failure to comply with such predicted export volume may result in such producers paying for non-used volume. The export organisations are responsible for the collection of data on expected harvest volumes from their producers. Analyses of previous export years are used to detect trends in the export volume, in order to better anticipate on seasonal variations. Problems arise when the predicted volume differs from the actual volume. In these cases, the export organisation would charge the costs for non-used volume to the producer remaining in default on its export plan (also called '*faux fret*'). However, generally a solution is found.

Under the overall guidance of OCAB, several activities have been undertaken by the sector to improve the quality and the homogeneity of the Ivorian pineapples. Since almost 50% of the total export comes from small-scale producers, the members of OCAB decided that this group deserves particular attention, since in most cases such producers are largely disconnected from the international market due to limited access to information, technology and capital. The quality of their produce tends to vary considerably and consequently cannot compete with the high quality homogeneous pineapples of companies as Dole and Del Monte.

As an important action in response to the need for better quality assurance, the export organisations, in 1991, decided to contract Veritas, an independent international quality control organisation, to conduct quality control activities in the port and at some of the packing stations. In November 1991, Veritas in close collaboration with OCAB, started to work in the pineapple and banana sector in Ivory Coast. All producers exporting through OCAB, have since then been obliged to collaborate with Veritas. In order to allow the producers to get used to the quality examinations (and in particular the consequences when a product would not comply with the quality requirements) Veritas introduced its quality control program in three stages. It was initially decided that 20% of the pallets per producer should be inspected. In October 1999, OCAB decided, however, to increase the quality inspection to a 100% check, implying that each and every pallet is inspected. This decision was taken because of low market prices in the European markets, in combination with an observed

⁸ The originally estimate of US\$ 72 per pallet proved not to be feasible. Interview with OCAB, January 1999.

decrease in quality of the pineapples. As a result of the 100% quality control, the total export of pineapples dropped by 20% in that year, but the price for pineapples in the European markets rose slightly⁹. Although producers have to pay a little money for the services of Veritas, they are pleased with this system since it assures them that their produce is of good quality and that the inspections are conducted by an independent organisation¹⁰. Furthermore, a quality label is attached to the produce, which is a very important indication for traders and consumers in the European markets.

Working with the Ivorian government, OCAB approached the European Union (EU) to raise the need for a credit support program. In January 1995, the EU started the credit support program ('Programme d'appui à la filière ananas en Côte d'Ivoire'). The overall aim of the program was to increase total pineapple production and enhance the quality performance by small-scale producers. To reach this aim, the program offered the opportunity to obtain agricultural inputs such as chemicals and fertilisers at a reduced price and with a pay-back period of 6 months; it did not lend cash to producers. The program collaborated with producers exclusively through the export organisations. If a producer wishes to purchase fertiliser or chemicals, he or she could make a request to an export organisation, which in turn, transmitted such requests to the program. Employees of the program examined the request and, together with the producer, prepared a production plan which indicated at what points in the production cycle the producer needed to apply particular inputs. Participating producers needed to adhere to the fertiliser formula prescribed by the program (15 grams of NPKMg/plant), and use recommended chemicals. Extension agents of the export organisations visited the producers on a regular basis in order to ensure that fertilisers and chemicals were applied according to the agreed production plan.

Despite the above mentioned actions undertaken by the pineapple sector in the early 1990s, OCAB and its members did, however, not sufficiently recognise that two other important trends that boosted the successful confrontation of the TNCs were, in fact increased consumer awareness and concern over food safety and identity, and the ongoing consolidation and related power position of a few large-scale retail companies that increasingly dictated the rules of the European fresh produce sector (see also Hendrickson and Heffernan, 2002; Gereffi *et al.*, 2001; Marsden *et al.*, 2000) which consequently impacted on the market position of the Ivorian pineapple.

5. The Ivorian response

In the light of the growing competition from the new pineapple variety in the mid-1990s, the question arises as to: how actors in the Ivorian pineapple sector, in this case mainly the intermediaries (most importantly OCAB), have responded to the

⁹ Interview with OCAB, December 1999.

¹⁰ In 1998, producers paid 1,21 FCFA/Kg (\pm 0.2 Euro cent/kg) for Veritas services. Interview with OCAB, August 1998.

introduction of the MD-2 variety? Well, first of all, the reaction has been very slow. This is remarkable considering the speed at which the new variety penetrated the market and the initially higher sales prices obtained by the new variety as opposed to the traditional pineapple varieties. Part of the reason for the late reaction is probably related to the comfortable position in which the Ivorian pineapple sector has operated since the early 1980s, facing limited external competition. The earlier failure of the introduction of the green pineapple variety Champaka by Dole and Del Monte in the early 1990s, probably further strengthened this confidence in the Cayenne Lisse. Besides, in view of its high price, most medium and large-scale producers did not attach a 'long commercial life' prospective to the MD-2 variety in the global market.

The interest of Ivorian producers in the new variety consequently arose only towards the end of the 1990s, triggered by a number of global and local developments. First of all, at the global level, the MD-2 variety proved to be very successful; the 'extra-sweet and golden' Central and South American pineapples continued to gain share in the European market. In 2000, OCAB, upon the request of its members, engaged on a collaboration with the private research institute 'Centre Techniques Interprofessionnel des Fruits et Légumes (CIFEL)' in Abidjan. Upon OCAB's request, CIFEL started trial fields to evaluate the cultivation of different pineapple varieties, including the MD-2 variety. However, so far only producers with adequate access to capital to invest have been able to convert their production to MD-2 pineapples. Due to the related investment costs and the technological requirements involved, other producers are forced to either continue with the production of the Cayenne Lisse pineapple, or shift to other less demanding varieties.

Triggered by the increasing international competition, OCAB furthermore initiated a discussion with its members on the development of an Ivorian pineapple brand. As discussed earlier, the main competitors of the Ivorian pineapple, such as Dole and Del Monte, all hold strong global brands, a brand that is recognised by consumers to represent high quality products. Although Ivory Coast has developed a country of origin logo for its pineapples which is attached to the carton boxes, the Ivorian pineapple is sold under many different brand names, mostly connected to individual importers. Also, a few, mainly medium and large-scale, producers export their pineapples under their own brand name. Even though there is a country logo, OCAB acknowledged that because of the large number of brand names used by the sector, and because these brands are not well known by the European consumers, there is no consumer loyalty to these brands. OCAB therefore started to introduce a new pineapple brand under the name 'Ivoria', which was presented to the sector in April 1999.

So far, only one export organisation (FDL) has managed to successfully introduce the new label Ivoria. Consequently, the bulk of the sector has not succeeded in branding the Ivorian pineapple as a unique product that conveys a specific experience or portrays the pineapple within its social and traditional territory-specific context. In effect producers fail to latch onto the social awareness (pineapples produced by small-scale producers) and the 'experiential' shopping behaviour (exotics of Ivory Coast)

of today's consumers. The contention is that if consumers could be connected to the specificities of the Ivorian pineapple (not just in terms of cost but also concerning issues of pineapple and producer diversity) then they may choose and prefer the Ivorian pineapple produced by predominately small-scale operations as against those supported by multinationals such as the MD-2 variety.

Driven in particular by the new demands for quality and safety assurance due to among others the food scandals (such as the mad cow disease and dioxin problems) in Europe in the 1990s, and the increased restrictions of residues on fresh exported produce by the EU, OCAB furthermore took the decision in 1999 to set up a full tracking and tracing system. The system was fully operational only in April 2003. The EU supported OCAB in the design and implementation of the tracking and tracing system¹¹. The system uses bar codes, and applies scanning machines (Terminal Portable) to read the bar codes and to link information to these codes. All packing stations, the port operators, the quality control agent Veritas, the freight forward company and most of the importers that have long-term relations with the Ivorian export organisations, use the scanning machine to read and add information to the system. The tracking and tracing system provides all involved actors the opportunity to follow the flow of the fruits. Producers can, for instance, log in to the intranet to check where the products are and whether they have already been unloaded from the ship. However, for many small-scale producers, access to and the interpretation of this information might not be so easy. Most of these producers live in remote areas and have no means to obtain Internet access. Also, these producers would need assistance in order to translate and analyse the information into practical understandable indicators.

During a visit to Ivory Coast in 2003, it became clear that a number of producers were wondering why all this 'fuzz' was needed just for some pineapples. From their perspective it did not make sense to build such a complex system around the pineapple as there have never been many problems with the fruit. According to one of them, the system was designed purely to provide OCAB, the French freight forward agent Léon Vincent and European importers with a strong control mechanism. The producer believed that these actors would benefit most from it. When rising the issue of consumers concerns in Europe about the use of chemicals, he argued 'European consumers should not worry too much about this as they have to peel the skin from the pineapple anyway before they can eat the fruit'. It appears, therefore, that although a sophisticated 'expert management system', as introduced by OCAB, may seem a very valuable marketing tool, many of the producers operating through OCAB may not see the relevance of it as they are not aware of developments in the international market that warrant such system.

¹¹ According to OCAB, the EU invested 532,000 Euro in the development of the tracking and tracing system, 2 million Euro in the cooling facilities of the new fruit quay in Abidjan and 16 million Euro in the construction of the new fruit quay, which became operational in 2003 (Source: Interviews with OCAB and SMPA, September 2003).

6. Concluding comments

Undoubtedly, under the guidance of the sector-wide pineapple organisation OCAB, a major effort is ongoing to re-polish the image and to enhance the performance of the Ivorian pineapple. A promising factor is that, despite the many struggles of the predominantly small-scale pineapple producers in Ivory Coast, as induced by the new global pineapple setting, they are still able to produce and sell pineapples for the global market. OCAB is a striking example of a sector in which individual actors, who are in fact competitors of each other, collaborate for the benefits of the group. Although this framework for cooperation is not excluded from social tension between the actors involved, most will agree that the Ivorian pineapple sector could not have achieved what it is today without such concerted approach: competing in the big league.

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Guanxi and quality performance in Chinese vegetables chains

Hualiang Lu, Jacques Trienekens and S.W.F. (Onno) Omta

Abstract

The aim of this study is to investigate the effects of the Chinese concept of *guanxi* networks on buyer-seller relationships and on quality performance in the vegetable sector in China. A survey on 167 vegetable sellers (farmers) and 84 vegetable buyers (processors, traders) was performed. For the analysis partial least squares (PLS) was used. Results indicate that farmers' *guanxi* networks positively influence buyer-seller relationships regarding the level of interpersonal trust and the level of transaction specific investments. In a trusted buyer-seller relationship, farmers are more willing to invest in specific transactional assets. Moreover, vegetable quality performance for farmers is closely related to such specific investments. Vegetable quality performance is also closely related to specific investments of the buyers. Buyers' *guanxi* networks, on the other hand, show no direct effect on transaction specific investment behaviour. The paper ends with managerial implications regarding the importance of *guanxi* networks in business practice.

1. Introduction

China claims to be the first most important vegetable producer in the world today, supplying more than half of the world vegetable production (FAO, 2001). With increasing consumers' concerns, vegetable quality and safety have increasingly drawn the attention of scholars and managers in China.

Since the start of the 1990s, relationship management has attracted much interest from academics and practitioners, especially in business-to-business relationships (Ganesan, 1994; Morgan and Hunt, 1994; Sheth and Shah, 2003). In this respect, *guanxi*¹², the Chinese version of relationship management or business networking, has become a growing research focus in recent years (Ambler, 1994; Davies *et al.*, 1995; Yau *et al.*, 2000; Wang, 2005).

Studies on *guanxi* first appeared in the West in the 1980s in popular business writings that advised about cultural factors affecting doing business in China (Pye, 1982; Butterfield, 1983; Alston, 1989). Later studies focused on the comparison of the concepts of business relationship and *guanxi* (Arias, 1998; Wong and Chan, 1999; Ramasamy

¹² The word *guanxi* in Chinese refers to the social network of personal relationships. It is composed of two Chinese characters, *guan* means gate and *xi* means connection. One must pass the gate to get connected to networks (Wang, 2005).

et al., 2006). Though, researchers already applied relationship management theory in China in different ways, such as marketing and negotiation (Lee and Lo, 1988), consumer studies (Yau, 1994), relationship marketing (Wong and Leung, 2001), direct selling (Merrilees and Miller, 1999), industrial marketing and purchasing (Fang, 2001), and nonfarm employment (Zhang and Li, 2003). Literature, however, less focuses on the agrifood sector (Cunningham, 2001). Previous research on business relationships has addressed several determinants of relational governance: trust (Anderson and Narus, 1990; Zaheer and Venkatraman, 1995), transaction specific investments (Klein *et al.*, 1990), and networks (Dyer, 1996; Claro *et al.*, 2003), but less attention had been put on the impacts of *guanxi* on business relations in China.

Guanxi is translated as personal connections or relationships to secure resources or to draw benefits from doing business as well as in social life (Davies, 1995). *Guanxi* seems to be the lifeblood of the Chinese social community, extending into business and even politics (Wong and Leung, 2001). *Guanxi* can be generally classified into three categories: family, friend and business *guanxi* (Fan, 2002). Family *guanxi* is generally a relatively permanent and stable social relationship. It occurs mostly among family members and it is governed by the need rule for social exchange and resource distribution within a family. Friend *guanxi* concerns rather stable and long term relationships with other people outside the family as a means or an instrument to attain material and/or mutual goals. Friend *guanxi* follows the reciprocity rule. Business *guanxi* is defined as the process of finding business (rather than personal) solutions through personal connections (Fan, 2002). Business *guanxi* is governed by equity rules. Because *guanxi* is transferable from person to person, it relates both to direct and indirect relationships of a person, family, friend, and/or business *guanxi*, in that way building up multilayer *guanxi* networks.

Guanxi can also be classified into horizontal and vertical *guanxi*. But these two types of *guanxi* are not absolutely distinguishable. From supply chain management point of view, we define the direct buyer-seller relationships which are associated with business activities as vertical *guanxi*, whereas the relationships used to support business activities (vertical *guanxi*) as horizontal ones. *Guanxi* contributes to business in different ways. *Guanxi* is crucial to the attainment of long-term business success in China (Yeung and Tung, 1996; Lou, 1997; Vanhonacker, 1997). *Guanxi* based transactions show transaction cost advantages (Standifird and Marshall, 2000). *Guanxi* has direct and indirect impacts on accessing new markets, finding new customers; building trust in buyer-seller relationships, and enhancing investment behaviour. Ultimately, *guanxi* networks may contribute to firm performance.

The objective of this paper is to propose a conceptual framework for relationship management in the agribusiness sector in China and to investigate the effects of *guanxi* networks on buyer-seller relationships as well as on quality performance. We test the conceptual model for both sides of buyer-seller relationships.

The remainder of this paper is structured as follows. Section 2 and section 3 describe the constructs of *guanxi* networks, trust and transaction specific investments and propose hypotheses. Section 4 introduces the research design and data analyses methods. The empirical results are provided in section 5. Conclusions and discussions are shown in section 6. The paper ends with managerial implications regarding the contribution of *guanxi* networks in business practices.

2. Guanxi networks in buyer-seller relationships

2.1. Guanxi networks and trust

Guanxi is first and foremost about the cultivation of long-term personal relationships (Standifird and Marshall, 2000). In Chinese society, *guanxi* is ubiquitous and plays a central role in daily social and business life. *Guanxi* networks provide assurance in exchange behaviour (Standifird and Marshall, 2000). Support by *guanxi* networks can be: introduction of new business partners, access to new markets, acquisition of market information, etc.

In a *guanxi* network, the loss of exchange opportunities with one network participant can easily result in the banishment from the network altogether. So the cost of opportunism is the potential loss of exchange opportunities with all members of the network. Therefore, *guanxi* networks lead to the creation of relationship-sustaining factors such as trust and commitment (Standifird and Marshall, 2000). The larger and more richly connected the *guanxi* networks, the greater the assurance that an individual exchange partner within the network will not show opportunistic behaviour. When a transaction is made with a firm of known reputation and capabilities, there is an associated implication that possible problems will be guarded against through social bonds (Thorelli, 1986). Previous empirical research showed that *Guanxi* networks encourage interpersonal trust (Farh *et al.*, 1998), and promote trust-based exchanges (Hill, 1995). For the same reason, if business relationships are built based on *guanxi* networks or supported by *guanxi* networks, then such relationships will be safeguarded by *guanxi* networks. Thus people are more willing to engage in interpersonal trust based on *guanxi* networks. So we propose that:

H1: Trust between buyers and sellers will be higher if buyer-seller relationships are supported by *guanxi* networks.

2.2. Guanxi networks and transaction specific investments

Transaction specific investments (TSIs) made by farmers may support long-term relationships with buyers. Such investments promote relational exchanges and increase the commitment between partners (Cook and Emerson, 1978). Higher levels of TSIs lead to increased costs of replacing an exchange partner (Barney and Ouchi, 1986). This means that TSIs also create dependency and increase the risk of high costs in

the case of opportunism which is also known as lock in effects. Sellers and buyers in business relationships in which there is high level of information asymmetry, find it difficult to estimate the true value of their TSIs. In that case firms are subject to significant threats of opportunism and dependency.

Contrary to the common perception, *guanxi* is more than the exchange of gifts in order to achieve favourable business exchange. The flexible and socially-based nature of *guanxi* permits members of a *guanxi* network to deal with unforeseen contingencies arising after the agreements are reached. *Guanxi* networks thus possess the capacity to reduce transaction costs associated with environmental and behavioural uncertainties, and opportunism (Standifird and Marshall, 2000). *Guanxi* networks do not incur the costs of documentation or arbitration associated with other governance forms. As a result, *guanxi* networks may handle an increased level of asset specificity. Under the safeguarding of *guanxi* networks, business relationships with transactions with specific investments become tighter and stable. Therefore, we expect that people will be more willing to invest when buyer-seller relationships are supported by *guanxi* networks. So we formulate the following hypothesis:

H2: Sellers and buyers will invest more in transaction specific assets if buyer-seller relationships are supported by *guanxi* networks.

3. Transaction specific investment in buyer-seller relationships

A principal focus of transaction cost economics is the decision to create specific transactional assets (Williamson, 1985). Bounded rationality and opportunism are the two key assumptions of transaction cost economics. Bounded rationality implies that human actors as well as firms are incapable of perfect contracting. As such, certain environmental and behavioural uncertainties inevitably arise. Opportunism is the assumption that, given the occasion, decision-makers may act with their own interests (Williamson, 1985), and that it is difficult to know in advance who is trustworthy and who is not (Barney, 1990). Opportunism may lead to governance problems in situations of asset specificity. In case of highly asymmetric information and unequal negotiation power, vegetable farmers, as the weak party in supply chains, do not have sufficient incentives to engage in specific investments.

On the other hand, transaction specific investment is an important mechanism for achieving closeness in a buyer-seller relationship. TSI reassures the counterpart about the intentions and integrity of the investor. Creating specific assets is known as creating credible commitments (Heide and John, 1988) or pledges (Anderson and Weitz, 1989), thus the so called preferred buyer-seller relationships will be formed. The existence of TSIs largely restricts channel access for new actors. Investment behaviour for transaction specific assets will be influenced by the level of trust one dedicates to the counterparts. Once trust is established, opportunistic behaviour and uncertainty (risk) will be much lower in transactions, thus actors are more willing to

invest to adhere to the specific requirements of their partners. Based on the previous discussion, we propose the following hypothesis:

H3: Sellers and buyers will invest more in transaction specific assets if buyer-seller relationships are based on trust.

Sellers and buyers engaged in buyer-seller relationships may invest in various forms of TSIs. Two dimensions of TSIs are commonly distinguished, namely physical TSI and human TSI. Physical TSIs are those equipments and facilities which may improve production, processing and handling practices; while human TSIs are mainly focused on knowledge, skills and experiences regarding production, processing and handling. Dedicated physical equipments may serve the partner's quality requirements. Recalling food production characteristics of freshness and hygiene, the vegetable sector requires high quality cooling storage and transportation facilities, and standardised handling and processing procedures. Also special production techniques and managerial skills may be required to deal with vegetables in a good manner. Thus both types of TSIs may contribute to the quality of fresh products which lead to a higher level of quality performance. Differing from the traditional definition of quality which is based on physical attributes, such as nutrition, colour, shape etc., we define quality from a human behaviour perspective based on perception. If buyers get good quality vegetables, they will perceive a high level of satisfaction. On the other hand, low quality vegetables will result in low level of perceived satisfaction. So quality satisfaction is the reflection of actual vegetable quality. Based on previous discussion, we propose:

H4: Quality performance will be high if buyer-seller relationships are associated with a high level of transaction specific investments.

Figure 1 summarises the previous discussion for the relationships of *guanxi* networks, buyer-seller relationships and quality performance.

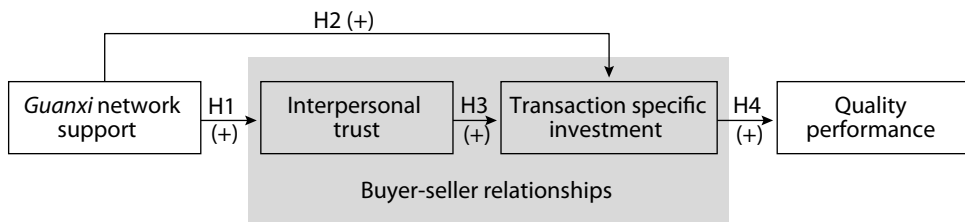


Figure 1. Conceptual framework with hypotheses and expected sign.

4. Research design

4.1. Data

Data were collected from two major groups of chain participants in the vegetable supply chain in Jiangsu Province, P. R. China, vegetable sellers (farmers) and vegetable buyers (processing companies, exporters, supermarkets etc.). Vegetable farmers in China are characterised as small scale, traditional techniques, and scattered production. After a long period of market development and with the liberalisation of the marketing system in the 80s and 90s, Chinese vegetable markets became more competitive (Ahmadi-Esfahani and Stanmore, 1997). Farmers now rely on different channels to market their products. Channels include large-scale wholesale markets located in consumption and production areas, retail markets (mainly wet markets), newly developed local and foreign owned supermarkets, and international markets linked through processing and exporting companies. Vegetable farmers can deliver products to different market outlets directly or through middlemen. Delivery conditions, buyer-seller relationships and quality demands widely differ amongst these channels, offering farmers different incentives to engage in *guanxi* networks, trusted relationships and investments.

Most of the buyers are vegetable processing companies. The vegetable processing company is one of the modern formats in the vegetable sector in China. The vegetable processing industry has grown rapidly in the last 5 years. It consumes nearly quarter of the total fresh vegetables in China. But most of the processing companies, though rather new, are small in terms of employees and sales volumes. However, they are significantly different from the traditional traders regarding marketing position and marketing strategies. Some companies have multiple marketing strategies, targeting both international and domestic markets. Others, however, only focus on either domestic markets or international markets. The quality requirements and transaction conditions differ in international and domestic markets which show significant impacts on the procurement and processing practices regarding investments and buyer-seller relationships engagement (Lu *et al.*, 2006). Processors can purchase fresh vegetables from farmers or large company based producers directly, or build up their own special production bases. They also can purchase vegetables from the wholesale markets or buy pre-processed vegetables from other food processing companies during shortage periods.

The first version of the questionnaire was developed based on previous research in the fields. To optimise the questionnaire items, valuable insights were obtained through a series of eight case studies (Lu *et al.*, 2006). These case studies served the research in two ways. First, they were used to discuss the research topics. The discussions with the interviewees helped to identify the concepts of *guanxi* networks and buyer-seller relationships. Second, the interviews were important for formulating the questions in the questionnaires. It was crucial that the respondents could easily understand the questions. After the case studies test interviews were performed, interviewees were asked to complete the questionnaire and raise questions where

problems and ambiguities arose with wording and questionnaire layout. This yielded useful suggestions that improved the content validity of the questionnaire. The final questionnaire for vegetable sellers and buyers included five major parts: basic information, vegetable production (or buying), *guanxi* network, buyer-seller relationships, and quality performance.

All the measures included in the data analysis were operationalised by multiple items. Five-point Likert scales (1=not agree at all, to 5= totally agree) were chosen here over seven-point or ten-point scale, since several interviewees pointed out to be more familiar with five-point scales as these are more commonly used in Chinese marketing research. We used forward and backward translation techniques to translate the English items into Chinese. Samples were selected following a stratified random selection procedure in several predetermined areas with different social economic characteristics (developed, average and less developed area) in Jiangsu province. All data were collected based on personal interviews. 167 seller and 84 buyer questionnaires were finally used for further analysis.

4.2. Methods

After the data were collected, the measures were subjected to a purification process involving a series of reliability and validity assessments using statistical software of SPSS (Field, 2005) and the path analytical tool partial least-squares (PLS; Wold, 1982). First, Exploratory Factor Analysis (EFA) was carried out with SPSS to determine the best multiple items for each latent variable (constructs of *guanxi* network, trust, transaction specific investments and quality performance). The item-to-total correlations and the Cronbach alpha of each construct were calculated to determine reliability. Following this step the method of component-based latent variables partial least-squares (PLS) was employed. A general PLS model is composed of two parts: the measurement model and the structural model. The measurement model specifies the relations between the manifest variables and the constructs which they represent while the structural model specifies the relations among the constructs (or latent variables in Figure 1). The choice for PLS was motivated by several considerations. First, the small sample size makes it unlikely that the assumptions for maximum-likelihood estimation are satisfied¹³. Second, some theoretical problems, such as inadmissible solutions (e.g. negative error) and factor indeterminacy (e.g. rank and order condition), have been identified with Lisrel's maximum-likelihood estimation approach (Fornell and Bookstein, 1982). However, PLS can solve these problems. PLS estimation also imposes substantially less conditions for its use. It requires only that the basic assumptions of least squares estimation are satisfied. To statistically evaluate the model, one can use jackknife or bootstrap (Efron and Gong, 1983) in combination with traditional measures of goodness of fit (Bagozzi, 1981). Furthermore, PLS can

¹³ As Anderson and Gerbing (1988) pointed out that in a "...Lisrel program..., a sample size of 150 or more typically will be needed to obtain parameter estimates that have standard errors small enough to be of practical use." The samples we have (167 and 87 for sellers and buyers respectively) are recognised as rather small data sets.

model both formative and reflective indicators simultaneously (Fornell and Bookstein, 1982). These advantages have encouraged PLS applications in an increasing number of fields, including education (Noonan, 1982), chemistry (Geladi and Kowalski, 1986), marketing (Zinkhan *et al.*, 1987), commercial banking (Cool *et al.*, 1989), and more recently, strategic management (Fornell *et al.*, 1990; Johansson and Yip, 1994; Birkinshaw *et al.*, 1995).

The path coefficients obtained from a PLS analysis are standardised regression coefficients, while the loadings of items on individual constructs are factor loadings. Thus, PLS results can be easily interpreted by considering them in the context of regression and factor analysis. However, PLS provides a clear advantage over regression for two reasons: (1) it considers all path coefficients simultaneously to allow the analysis of direct, indirect and spurious relationships; and (2) it estimates the individual item weightings in the context of the theoretical model rather than in isolation.

In testing our measurement model with PLS all items with loadings lower than 0.6 were removed. Composite reliability, average variance extracted for each construct and cross loadings for each item were obtained to show internal consistency and discriminant validity. After purifying the items for the constructs, the second PLS stage (structural modelling) was followed. To estimate the paths between the constructs showed in Figure 1, and thereby test the proposed hypotheses, we selected Visual PLS 1.04 which is newly developed by Fu (2006). For hypothesis testing, Chin (1998) recommends bootstrapping (generating a large number of random samples from the original dataset by sampling with replacement). Path coefficients are reestimated with each random sample, and mean parameter estimates and standard errors are computed across the total number of samples. Following Chin (1998), we ran 500 samples.

4.4. Measurements of constructs

Multiple items were used to measure the constructs in this research: *guanxi* networks, interpersonal trust, transaction specific investments, and quality performance¹⁴.

Guanxi network support refers to what extent, vegetable sellers and buyers use their *guanxi* networks to help them in their marketing activities. Five items and two items¹⁵ were used to measure the *guanxi* networks of vegetable sellers and buyers respectively. Items such as to what extent *guanxi* networks support to find new buyers, to access (new) markets, to improve production techniques, to build trust with counterparts were used to measure the *guanxi* network construct. This study's measurement

¹⁴ The description of the measures and items are listed in Appendix 1 and 2, for the sellers and the buyers sample respectively.

¹⁵ Originally we had same items for buyers, but we filtered out the others during the exploratory factor analysis.

instrument of *guanxi* network was developed based on previous researches (Anderson *et al.*, 1994; Blankenburg *et al.*, 1999; Claro *et al.*, 2003).

Interpersonal trust in operational terms refers to the personal belief that the other person is honest and sincere, and in no circumstances will deliberately do anything to damage the relationships and incur cost for him. Previous transaction experience, reputation and trustworthiness are the major reflective perspectives for trust. Interpersonal trust rather than organisational trust is the main focus in this study because the previous case study showed that the vegetable transactions in China are personal based rather than organisation based. This choice is also consistent with the characteristics of personal based relations in *guanxi* networks. Seven and six items with Likert scales assessed the construct interpersonal trust for the seller and buyer samples respectively. The measurement instrument was based on the studies of Zaheer *et al.* (1998) and Claro *et al.* (2003).

Transaction specific investments refer to the seller's (buyer's) perception of the extent to which an investment was made specifically for the transaction with the selected counterpart. These investments can be physical or human investments. First, the measurement of physical TSIs refer to investments such as equipment machineries, facilities etc. specifically for the counterpart. Second, the measurement of human TSIs refers to investments in human resources, such as training of staff in terms of knowledge about counterparts, methods to deal with counterparts, and other business practices specifically to operate with counterparts. This construct was measured with five and two items for sellers and buyers respectively which are developed based on previous studies (Heide and John, 1988; Claro, 2004).

Quality performance refers to the perceived satisfaction of vegetable quality. The seller samples were measured by the perceived buyer satisfaction regarding the quality of the vegetables and the seller satisfaction regarding the price from the vegetables received from the buyers. While the buyer samples were measured by the perception of the delivery quality (consistency and reliability). This instrument was also developed based on previous researches (Bensaou and Venkatraman, 1995; Zaheer *et al.*, 1998) and practical experiences.

5. Empirical results

5.1. Reliability and validity of measures and constructs

As discussed in the previous section, PLS results are presented in two stages. In the first stage, the researcher ensures that the measures used as operationalisation of the underlying constructs are both reliable and valid. Once convinced of the adequacy of the measurement model, the research can then proceed to interpret the resulting model coefficients. Following common practice (Mathieson *et al.*, 2001; Jones *et al.*, 2002), we examine the reliability of the individual items, the internal consistency (composite

reliability), average variance extracted for each construct, and discriminant validity between constructs (see Appendix 1 and 2, Table 1 and 2).

Individual item reliability was determined by examining the loadings of measures on their corresponding constructs. In all cases, only individual factor loadings greater than 0.6 were retained. All loadings are greater than 0.7 in our case, indicating a high degree of individual item reliability (see Appendix 1 and 2).

Internal consistency was assessed using a measure of composite reliability which was suggested by (Fornell and Larcker, 1981). This measure is similar to Cronbach’s alpha as a measure of internal reliability, and the interpretation of the values obtained is also similar. An internal consistency of value of 0.7 or greater is reasonable for exploratory research (Nunnally, 1988). In the current study, composite reliability for all constructs exceeds 0.80 both for seller and buyer samples (see Table 1, *italic* column), indicating a good internal consistency.

We also assessed the discriminant validity of constructs used in the model (Fornell and Larcker, 1981). Table 1 also shows the correlations matrix of the constructs. The diagonal elements in this matrix show the square root of the average variances extracted (AVE). This can be done in two ways. First, for adequate discriminant validity, the diagonal elements should be greater than all correlations of the constructs, as is the case here. Second, the test involves assessing how each item is related to the latent construct. Table 2 reports the items loadings on the construct. No item loaded more highly on another construct than it did on its associated construct. Both of these criteria indicate that the discriminant validity of the constructs used in the current model is more than adequate. So we can confidently rely on these coefficients to interpret the relationships among *guanxi* network, interpersonal trust, transaction specific investments and quality performance.

Table 1. Composite reliability, variance extracted, and inter-correlations of constructs.

Variables	Seller sample (N=167)					Buyer sample (N=84)				
	Composite reliability	<i>Guanxi</i>	TSI	Trust	Quality	Composite reliability	<i>Guanxi</i>	TSI	Trust	Quality
<i>Guanxi</i>	0.90	0.81				0.84	0.86			
TSI	0.94	0.47	0.87			0.90	0.20	0.90		
Trust	0.91	0.47	0.53	0.76		0.90	0.31	0.28	0.77	
Quality	0.85	0.43	0.55	0.49	0.86	0.88	0.30	0.20	0.65	0.88

Note: The *italic* column is composite reliability. The bold numbers on the diagonal are the square root of the variance shared between the constructs and their measures (square root of Average Variance Extracted). Off-diagonal elements are correlations among constructs.

Table 2. Construct to item measure loadings and cross loadings.

Items	Seller sample (N=167)				Buyer sample (N=84)			
	<i>Guanxi</i>	TSI	Trust	Quality	<i>Guanxi</i>	TSI	Trust	Quality
gx1	0.884				0.951			
gx2	0.753				0.749			
gx3	0.728				--	--	--	--
gx4	0.868				--	--	--	--
gx5	0.791				--	--	--	--
invest1		0.914		0.503		0.961		
invest2	0.503	0.915				0.837		
invest3		0.891			--	--	--	--
invest4		0.840			--	--	--	--
invest5		0.805			--	--	--	--
trust1			0.735				0.765	
trust2			0.739				0.719	0.583
trust3			0.728				0.711	
trust4			0.757				0.752	
trust5			0.736				0.821	
trust6			0.793				0.865	0.645
trust7			0.838		--	--	--	--
quality1				0.821			0.617	0.861
quality2		0.526		0.895			0.543	0.904

Note: The bold numbers indicate the correspond constructs, the other numbers indicate the cross loadings (the cross loadings smaller than 0.5 are not displayed for easy reading).

5.2. Test of the conceptual model

5.2.1. Seller sample results

The results of the conceptual model for vegetable sellers (farmers) are shown in Figure 2. All four relationships examined were significant at 1% level. The model explained 22%, 34% and 30% of the variance in interpersonal trust, transaction specific investment and quality performance respectively for the vegetable seller sample. The overall R^2 for the estimated model is 0.29 which indicates good prediction accuracy.

As predicted, the impacts of farmers’ *guanxi* networks on interpersonal trust, and transaction specific investments are both statistically significant and positive. It indicates that buyer-seller relationships will be better if such relationships are based on or supported by *guanxi* networks. The support can be production technology improvement via the *guanxi* network, finding (new) buyers and accessing (new) markets

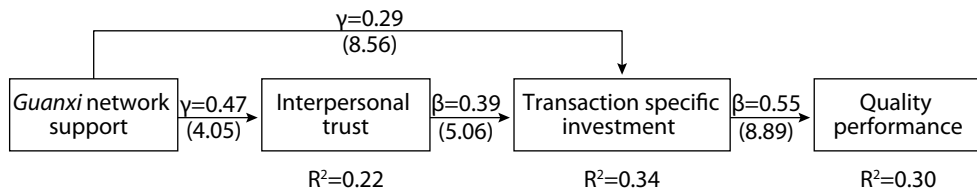


Figure 2. Standardised solutions for vegetable farmers.

Note: *t* values are in parentheses, all path coefficients are significant at 1% ($t > 2.58$).

via *guanxi* networks, building firm relationships with input suppliers or vegetable buyers via *guanxi* networks, etc. As a result, vegetable farmers in Jiangsu province are more willing to build personal trust and are more willing to invest in specific assets for vegetable production and marketing facilities when they have a well developed *guanxi* networks that can support them. Results also show a positive relationship between interpersonal trust and transaction specific investments for vegetable farmers. This demonstrates that farmers are more willing to invest in vegetable production and selling facilities if they trust their vegetable buyers. Transaction specific investments in buyer-seller relationships significantly positively influence quality satisfaction. This implies that the quality performance in vegetable supply chains indeed can benefit from higher levels of specific transactional assets.

We also investigated the total effects (i.e. indirect + direct effects) for each construct. Total effects provide an indication of the relative magnitude of the effects of each exogenous construct on the endogenous constructs within the context of the model tested. Using total effects coefficients, we can not only compare the magnitude impacts of different exogenous constructs on the same endogenous construct, we also can compare the magnitude of the impacts of the same exogenous construct on different endogenous constructs. Total effects coefficients for vegetable sellers corresponding to Figure 2 are listed in Table 3.

Table 3. Total effects of the theoretical model for vegetable farmers^a.

Exogenous construct	Endogenous construct		
	Interpersonal trust	Transaction specific investment	Quality performance
<i>Guanxi</i> network support	0.47	0.47	0.26 ^b
Interpersonal trust	--	0.39	0.21
Transaction specific investment	--	--	0.55

^aTotal effects coefficients are calculated based on the path coefficients in Figure 2.

^b0.26=0.47*0.39*0.55+0.29*0.55.

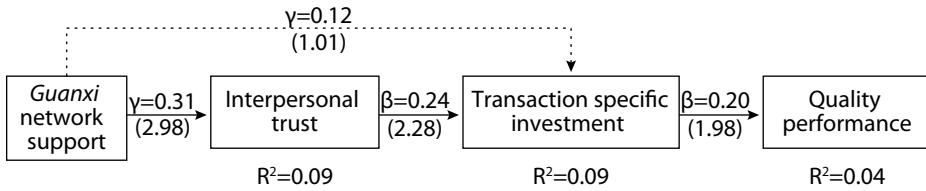


Figure 3. Standardised solutions for vegetable companies.

Note: *t* values are in parentheses, path coefficients are significant at 5% ($t > 1.96$), at 1% ($t = 2.58$).

The total effects of vegetable sellers’ *guanxi* networks equally influence interpersonal trust and transaction specific investments. *Guanxi* network also show a significant total effect on quality performance. From the framework model, we find that the total effects on quality performance are via the impacts of interpersonal trust and transaction specific investment. We also found that *guanxi* networks show a greater total effect on buyer-seller relationships than on quality performance. Similar conclusions can be drawn for interpersonal trust. Although we did not investigate the direct effects of trust on quality performance, the total effects do infer a significant strong impact of trust on performance.

Although both *guanxi* networks and interpersonal trust have impacts on transaction specific investment, the magnitude of the impact of *guanxi* network is 20% more than interpersonal trust (i.e. $0.47/0.39=1.21$). For the impacts on quality performance, we found that the magnitude of the impacts of transaction specific investment is two times more than the impacts of *guanxi* network and interpersonal trust ($0.55/0.21=2.62$, $0.55/0.26=2.12$). So we conclude that in order to achieve a higher level of vegetables quality performance, farmers can either increase transaction specific investment in facilitating their production and marketing activities or build trusted buyer-seller relationships with preferred buyers. But farmers also should be aware of the importance of building and maintaining a well developed personal *guanxi* networks and to fully utilise *guanxi* networks to facilitate and to improve marketing activities.

5.2.2. Buyer sample results

The results of the conceptual model for vegetable buyers are listed in Figure 3. Three out of four relationships examined were significant at 5% level; all the signs of the path coefficients were coherent with our expectations. The PLS model explained 9%, 9% and 4% of the variance of interpersonal trust, transaction specific investment, and quality satisfaction respectively for vegetable company samples¹⁶.

¹⁶ Compared to the seller sample, the R^2 of the buyer sample is rather low. This may be due to the missing important relationships in the proposed model. For an explorative purpose, we estimated an alternative model with a direct relation between trust and quality performance. Results indicated this direct relation as significant and positive (standardised coefficient 0.67, *t* statistics 9.24). With this direct effect, the R^2 for quality performance is much higher (0.46) while the other results are similar (see Appendix 3).

Similar to vegetable sellers, the impact of vegetable buyers' *guanxi* networks on interpersonal trust are statistically significant and positive. It indicates that if the business relationships with vegetable sellers are built based on *guanxi* networks or supported by *guanxi* networks, buyers are more willing to trust their suppliers. Surprisingly, companies' *guanxi* networks do not show significant direct impacts on transaction specific investment related to their business transactions. This may be due to vegetable companies not investing much in procurement processes, compared to vegetable farmers who invest a lot for vegetable production and marketing practices. Results also show that interpersonal trust of vegetable buyers significantly improves transaction specific investment and that investments positively influence quality performance of vegetable suppliers, as we expected. This indicates that a high level of quality performance can be achieved through either a high level of interpersonal trust or a high level of investments facilitating the transactions.

We also investigated the total effects for vegetable buyers. The total effects corresponding to Figure 3 are listed in Table 4. Results show that the impacts of *guanxi* networks on interpersonal trust are higher than the impacts on transaction specific investments and on quality satisfaction. Interpersonal trust also shows less impact on quality satisfaction compared to the impacts on investments. Both *guanxi* networks and interpersonal trust show significant total effects on transaction specific investment behaviour.

When we investigate the total effects on quality performance, we can conclude that the total impacts from transaction specific investments are far more important than the total impacts from *guanxi* networks and interpersonal trust (0.20 vs. 0.04 and 0.05). This indicates that for vegetable buyers, compared to *guanxi* network and interpersonal trust, increased investments in specific transactional assets is a most efficient way to achieve a good quality performance.

Table 4. Total effects of the theoretical model for vegetable companies^a.

Exogenous construct	Endogenous construct		
	Interpersonal trust	Transaction specific investment	Quality performance
<i>Guanxi</i> network support	0.31	0.19	0.04
Interpersonal trust	--	0.24	0.05
Transaction specific investment	--	--	0.20

^aTotal effects coefficients are calculated based on the path coefficients in Figure 3.

6. Conclusions, discussions and suggestions for further research

In this study, we examined the role of *guanxi* networks in Chinese agribusiness sector. We mainly focused on the concepts of interpersonal trust and transaction specific investment in buyer-seller relationships to show how these contribute to quality performance improvement.

6.1. Conclusion and discussions

Most of the hypotheses in this study are supported for both the seller and buyer data sets. But significant different patterns were also discovered.

Food quality, a diversified concept, subjective or objective, becomes the most important attribute for agriproducts. All participants in vegetable supply chains try to achieve customer perceptions of high quality. Our study shows that the perceived vegetable quality satisfaction in Chinese vegetable supply chains is not only closely related to buyer-seller characteristics, such as interpersonal trust and transaction specific investment, but also indirectly influenced by *guanxi* networks.

For vegetable farmers in Jiangsu Province, transaction specific investments significantly improve quality performance, while interpersonal trust with their buyers has an indirect contribution to quality performance. This implies that the vegetable farmers in Jiangsu province will be repaid if they give more efforts to building trusted buyer-seller relationships. *Guanxi* networks of vegetable farmers also show indirect effects on quality performance. This suggests that vegetable farmers in Jiangsu Province can improve their marketing performance (quality perspective) relying not only on good buyer-seller relationships, but also on well developed *guanxi* networks.

For vegetable buyers, on the other hand, *guanxi* networks also show an indirect contribution to quality performance in vegetable supply chains. *Guanxi* networks improve trust with vegetable suppliers, but *guanxi* networks showed limited influence (direct and/or indirect) on transaction specific investment. This implies that companies make decisions based on the overall contribution of the investments to companies' development while not simply relying on personal relationships or trust. This result was coherent with the findings of the previous case studies (Lu *et al.*, 2006).

6.2. Limitations and suggestions for further research

The implications of this research should be evaluated in the light of the following limitations. Along these lines, we also suggest some directions for further research.

First, vegetable sellers and buyers have diversified channels to market their products. Our research pooled all channels. In doing this we ignored the differences in characteristics of marketing channels. However, it is reasonable to assume that the importance of *guanxi* networks differ across channels. To overcome this limitation, it

is necessary and also important to further study the buyer-seller relationships based on different marketing channels.

Second, the variables in our study were bilateral (e.g. trust, quality satisfaction), but the two data sets used in this study did not precisely reflect the same bilateral buyer-seller relationships. So in future research, we should apply an integrated research model based on the same buyer-seller relationships.

Third, buyer-seller relationships have been studied as a form of relational exchange (Heide, 1994; Dyer and Singh, 1998; Claro *et al.*, 2003). Since *guanxi* networks in China showed importance in business activities both for sellers and buyers, we are also interested to study if *guanxi* networks influence marketing channel and governance choice. So marketing channel and governance attributes can be added to the model for further research.

Fourth, cross-sectional design prevents the investigation of dynamic effects of *guanxi* networks and the elements of buyer-seller relationships. Previous research already showed that trust in supply chain partnership is highly associated with both sides' specific asset investments (Suh and Kwon, 2006). However, proof of such causal relationships requires a longitudinal research design. Further work along this line is therefore necessary.

6.3. Managerial implications

The results of this study suggest that *guanxi* networks show a positive contribution to buyer-seller relationships and may enhance quality performance in the vegetable sector in China. Managers may use this study and its empirical evidence as a check on the adequacy of their existing *guanxi* networks and type of benefits their networks might provide. *Guanxi* networks increase the success possibility to access new markets and to maintain long-term relationships. So it is beneficial for companies to put extra efforts to build up strong *guanxi* networks to expand their markets and to develop their business. Companies should then increase face-to-face communications, frequency of contacts, information sharing and should show honesty and sincerity to each person in their *guanxi* networks. But they also should be aware of the costs to build and maintain such *guanxi* networks. If managers either under- or overestimate the negative/positive effects of *guanxi* networks, their efforts would be misguided which would eventually lead to satisfaction decrease (Schramm and Taube, 2002).

Vegetable farmers also can use this study to improve their marketing positions. Results show that close relations and interpersonal trust with buyers improve quality performance in marketing activities. This may be due to the reduction of opportunistic behaviour related to a high level of trust. Farmers can reduce market risk, achieve strong negotiation positions when they are being highly organised (World Bank, 1996). Farmer organisations also can help farmers to access newly developed markets, such as supermarkets and international markets. Collaboration may extend

farmers' *guanxi* networks and increase the capacity to invest in specific transactional assets. Thus farmers can further improve their marketing performance and get better marketing positions to achieve a better welfare when they work together.

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Appendix 1.
Constructs and items used in the model for seller samples (N=167)

Construct	Items	Loading
<i>Guanxi</i> network support ($\alpha=0.89$)	My <i>guanxi</i> network supports me to building trust with my input suppliers	0.88
	My <i>guanxi</i> network supports me to access to this market	0.75
	My <i>guanxi</i> network supports me to find new buyers in this market	0.73
	My <i>guanxi</i> network supports me to build trust with my buyers	0.87
	My <i>guanxi</i> network supports me to improve my production technology	0.79
Interpersonal trust ($\alpha=0.87$)	The buyers I trade with have a good reputation	0.73
	I should not hesitate to make important selling decisions based on my buyers' suggestions	0.74
	My previous relationships with my buyers are satisfactory	0.73
	I expect the buyers to be working with me for a long time	0.76
	The buyers have been fair in their negotiations with me	0.74
	Based on experience, I can with complete confidence rely on the buyers to keep their promises to me	0.79
Transaction specific investment ($\alpha=0.92$)	The buyers are trustworthy.	0.84
	I have made large investments for vegetable production in the last three years	0.91
	I have made a large investment for vegetable quality upgrade in the last three years	0.92
	I have made significant investments to deliver products	0.89
	If I switch to another market we would lose a lot of investments that I have made to sell to this market	0.84
	If I decided to stop working in this market, I would waste a lot of knowledge regarding the method of operation for this market	0.81
Quality performance ($\alpha=0.62$)	My buyers are satisfied with the quality of my vegetables	0.82
	I am happy with the price I get from my buyers	0.89

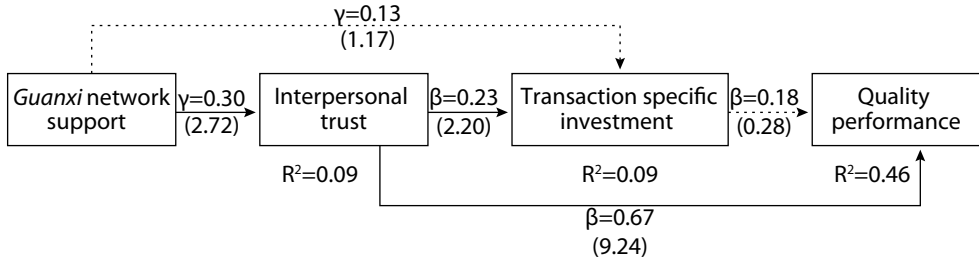
Note: All items are measured by 5 point Likert-scale (not true at all - totally true).

Appendix 2.
Constructs and items used in the model for buyer samples (N=84)

Construct	Items	Loading
<i>Guanxi</i> network support ($\alpha=0.67$)	My <i>guanxi</i> network supports me for specific investments	0.95
	My <i>guanxi</i> network supports me for less conflict regarding payment	0.75
Interpersonal trust ($\alpha=0.85$)	The suppliers we trade with in this market have a good reputation	0.77
	We should not hesitate to make important purchasing decisions based on our suppliers' suggestions	0.72
	We expect the suppliers to be working with us for a long time	0.71
	The suppliers have been fair in their negotiations with us	0.75
	Based on experience, we can with complete confidence rely on the suppliers to keep their promises to us	0.80
Transaction specific investment ($\alpha=0.79$)	The suppliers are trustworthy.	0.86
	We have made large investments for vegetable procurement in the last three years	0.96
Quality performance ($\alpha=0.71$)	We have made a large investment for vegetable quality control in the last three years	0.84
	This market delivers consistent quality vegetables	0.87
	Vegetable quality is reliable at this market	0.90

Note: All items are measured by 5 point Likert-scale (not true at all - totally true).

Appendix 3.
Alternative model for buyer sample



**Supply chain governance
and
quality management**

The plight of small-scale primary producers in international Nile perch marketing channels

Emma Kambewa, Aad van Tilburg and Richard Abila

Abstract

Although it is common knowledge that food quality is a competitive advantage for participating in international food chains and that ecological sustainability of the natural resources is the only guarantee for future existence of supply chains in the sector, it is not always obvious what challenges small-scale primary producers from developing economies face in order to meet quality standards and implement sustainable practices. This paper analyses the pressure from—and how small-scale primary producers in developing countries cope with—supply constraints and downstream demands for quality. The paper undertakes a case study of the fresh Nile perch fish channel from Lake Victoria in Kenya to understand how sustainability and coping with quality requirements of (distant) customers should be integrated in a suitable governance system; what they mean for public and private policy, and if improvement at the primary level is needed, what could be the intervention points that may need to be addressed. The paper shows that small-scale primary producers are caught up in a cobweb of challenges ranging from lack of appropriate production technologies, information asymmetries, ineffective enforcement for sustainable practices and welfare demands that limit their participation in the international supply chains. The paper argues that these challenges would be addressed if public and/or private policy would among other things, invest to enable primary producers (fishermen in this study) to access modern production technologies both for sustainable and quality-enhancing practices.

1. Introduction

When it comes to participation in international food chains, it is common knowledge that food safety is a bottom line and food quality is a competitive advantage. For natural resources (NR) such as the fisheries, ecological sustainability is the only determinant for long-term existence of the marketing channels. Mechanisms and institutions are in place to improve food quality and safety (e.g. the hazard analysis of critical control points – HACCP, Eurep-Gap), and also sustainability (e.g. the certification schemes such as the Marine Stewardship Council – MSC). These institutions however entail relatively huge financial and organisational resources that are often not met in developing countries (Panisello and Quantick, 2001; Henson and Loader, 2001; Henson *et al.*, 2000). As a result, developing nations, especially small-scale primary producers often fail to fully exploit the opportunities that arise from the increased integration of

world markets to improve welfare and economic development. In the process, small-scale primary producers are often excluded from global networks (Van der Meer, 2004). Yet, the role and activities of these small-scale primary producers remain vital. For example, most global channels originating from developing nations tend to have pyramid-shaped structure of which the base comprise numerous small-scale primary producers that in the end replenish the major export markets. The plight of these small-scale primary producers has often not been the target of marketing research and marketing policies in international marketing channels. As a consequence, little is known about how they cope with quality demands from the downstream and the pressure from declining NR production. Without this understanding, little can be said about how to improve their position in the global networks or how to improve sustainability of NR in the upstream.

In order to generate this understanding, this paper analyses the challenges and constraints facing small-scale primary producers in the fish (Nile perch) channel from Lake Victoria to Europe. Analysing the pressure from—and how small-scale producers cope with—supply constraints and downstream demands for quality from a marketing perspective is important to understand public and private policy implications, i.e. (1) how sustainability and coping with quality requirements of (distant) customers should be integrated in a suitable governance system; (2) what they could mean for public and private policy, and (3) if improvement at the primary level is needed, what could be the intervention points that may need to be addressed.

The chapter is organised as follows. As a start, a brief theoretical framework is given. Subsequently, a background to the case study is given. This is followed by a study methodology. Results and discussion of the challenges facing the primary producers conclude the chapter.

2. Theoretical background

Integrated supply chains are increasingly becoming important commercial tools for competitive strategies, assuring quality and food safety among other things. Although they normally serve high-end markets, especially in industrial countries, they are also increasingly being replenished by developing countries. However, the participation of small-scale primary producers from developing countries in these integrated global supply chains remains limited. Analysis of factors that contribute to limited participation of small-scale primary producers in global networks indicates that both market and policy failures contribute to the relatively weak competitiveness of small-scale producers (Nissanke and Thorbecke, 2006; Henson and Traill, 1993).

In order to assess the challenges that fishermen and middlemen face and how they cope with them, this chapter analyses how the upstream channel is organised. Channel structure tends to have implication for channel relationships. For example, channel structure determines an actor's structural power (Heide and John, 1992)

such as, in case of monopoly or oligopsony, supplier or buyers tend to have higher market concentration. Channel power also arises from ownership of or access to resources uniquely important for the transactions (Argyres and Liebeskind, 1999). Imbalances in power enable powerful actors to dictate and control the activities of the less powerful and dependent actors (Gundlach and Cadotte, 1994). We will examine power relations in terms of availability, access and ownership of unique resources that may influence channel performance.

There are different mechanisms in which economic transactions tend to be coordinated such as contracts, hierarchies or spot markets or a combination of these (Williamson, 1985). Actors may choose different governance mechanisms depending on the pressures and/or incentives that they encounter. This chapter analyses how transactions in the upstream are governed. In view of the increasing demands for quality, the chapter assesses how primary producers manage quality. At primary level where no major value adding activities take place, quality refers to the basic attributes such as freshness of the fish. Freshness is fundamental to fish quality and the most important quality attribute in fresh products. An estimate of freshness can be obtained by defining criteria related to changes in sensory attributes like appearance, odour, colour and texture, which can be measured and quantified by sensory or instrumental methods (Olafsdottir *et al.*, 2004). Furthermore, handling, processing and storage techniques, time and temperature may affect the freshness and overall quality of fish products. Quality management requires special facilities such as cooling facilities. Availability of these facilities tend to be a problem especially in developing countries and particularly so in rural areas. This chapter assesses how fishermen and middlemen manage quality with or without specialised facilities.

Since the fisheries are common property resources where access and utilisation is governed by regulatory frameworks, this chapter assesses the challenges and constraints for implementing sustainable practices. Sustainability of the fisheries is determined by assessing how fishermen and middlemen undertake their fishing and fish trading activities in relation to the recommended practices for sustainable utilisation of fisheries. This chapter examines how sustainable practices are being enforced and the associated challenges.

3. An overview of the Lake Victoria fresh Nile perch channel

Lake Victoria, the second largest fresh water body in the world is shared among Kenya (6%), Uganda (45%) and Tanzania (49%) (LVFO, 1999). Nile perch (*Lates niloticus*) was introduced into the Lake in mid 1950s to improve the productivity and commercial value (Geheb, 1997). Following the production boom about two decades later, the government formulated four main objectives namely (1) to increase per capita fish consumption; (2) to increase employment; (3) to enhance living conditions of the fishermen and their families; and (4) to maximise foreign exchange earnings. The Nile perch production boom triggered unprecedented socio-economic benefits such

as employment, food security and foreign exchange earning through the expansion of export markets. For example, regional employment in fisheries and support sectors increased more than two folds between 1980s and 1990s (Abila and Jansen, 1997). About 80% of the fishermen earned their primary income from fishing (Geheb, 1997) and the income was fairly and evenly distributed (Henson and Mitullah, 2003). Food security and nutritional status among the people improved significantly (Geheb, 2002; Gibbon, 1997). The bordering states moved from being net fish importers to net exporters in mid 1990s (Bokea and Ikiara, 2000).

However, in the course of increasing socio-economic benefits challenges emerged. By mid 1990s, fish catch and species diversity declined. Among other things, the decline was attributed to over-fishing that erupted in response to increased export demand. For instance, between 1970s and 2000, the number of fishermen in Lake Victoria increased by about 377% and fishing vessels (boats) increased by 326% (Jul-Larsen *et al.*, 2003; LVFO, 2000). Other factors contributing to catch decline were habitat degradation due to siltation, encroaching aquatic weeds, pollution and predation by Nile perch (LVFO, 1999).

With increased competition from export markets, domestic fish consumption significantly dropped such that by the late 1990s, the lakeshore areas where most fishing and fish processing take place registered the highest levels of food insecurity, malnutrition and absolute poverty (Geheb, 2002; Bokea and Ikiara, 2000). To-date the only Nile perch available to domestic market is the undersize, quality rejects and the by-products from filleting such as skins, fats and skeletons. Some factories closed down within the first decade of their establishment due to inadequate fish supply. By 2003, it was estimated that only about 38-57% of regional installed processing capacity was being utilised (Henson and Mitullah, 2003). The channels also faced setbacks with safety and quality requirements in late 1990's (i.e. 1997-1999) when the European Union banned fish imports from Lake Victoria on allegations of contamination by *Salmonella*, cholera outbreak and fish poisoning (Henson and Mitullah, 2003).

In summary, Lake Victoria Nile perch channel faces threats to sustainability and challenges to meet quality demands. Whereas regional efforts to conserve the fishery through minimising environmental pressure, over-fishing and destructive fishing methods are underway, (LVFO, 1999), the success faces enormous challenges. The channel therefore, presents an opportune case study to ask and address the issues of fisheries sustainability, quality and governance mechanisms. But first how is the channel organised in the upstream?

4. Study methodology

In order to investigate how small-scale primary producers cope with declining fisheries stocks and increasing quality demands, an exploratory case study research is undertaken. Case study is one way of undertaking social research often suitable

and preferred when (1) 'how' and 'why' questions are being asked; (2) researchers have no or little control over the events; (3) the focus of research is on contemporary issues within a real life situation and (4), when dealing with relatively new research topics (Eisenhardt, 1989; Yin, 1994). Case studies may accomplish different outcomes such to provide a description, test or generate hypotheses (or theory) (Yin, 1994; Eisenhardt, 1989). Since our research focuses on contemporary issues of enforcing sustainable and quality enhancing practices for which we do not have control, it befits to undertake an exploratory analysis.

Case study interviews were conducted in eight landing sites which were selected on the basis of landing Nile perch and ease of access. These 8 beaches were relatively large in size basing on the number of fishing boats landing fish (all fish types) at the beaches. The number of landing boats per beach ranged from 60 to 179. The key informants were the beach management units (BMU). BMUs are local administrative institutions set up to oversee the activities of the landing sites including hygiene, marketing, security and conflict resolution, among others. The BMUs comprise fishermen and traditional leaders surrounding the landing sites. In order to have a better channel perspective, middlemen, other fishermen and three processing factories were also interviewed. Two of the factories had an installed processing capacity of 40 tons per day and another one had an installed processing capacity of 15 tons per day. For policy and enforcement issues, relevant fisheries department personnel at area, district and regional levels were consulted.

Data was collected between January (2004) and March (2005) through literature review, semi-structured focus group discussions and personal interviews, and observations (Yin, 1994; Stewart and Shamdasani, 1990). A wide range of reports, publications and strategic plans covering socio-economic, biological, environmental and regulatory issues of Lake Victoria fisheries and Nile perch in particular were reviewed to substantiate the activities and challenges the channel face retrospectively. The literature was mostly obtained from the Kenya Marine and Fisheries Research Institute, a semi-autonomous institution mandated to conduct marine and fisheries research in Kenya. Focus group discussions mostly involved fishermen and members of the BMU. A few middlemen participated in focus group discussions in joint sessions with fishermen, because they could not be found in large number to warrant a group discussion of their own. The focus group discussions and personal interviews focussed on the participants' perception about their role and responsibilities and those of other stakeholders in sustainable fishing and how they manage fish quality.

Personal observations were conducted to verify issues that could not have otherwise been envisaged from interviews and discussions (Yin, 1994; DeWalt and DeWalt, 2002). Activities and practices deemed critical for both quality assurance and sustainability were explored through further discussions with respective actors. Similar observations were done at one factory where some of the quality defects were observed.

5. Results

This section presents major results. The results are presented in the following order (1) the structure of the upstream channel; (2) how actors govern their transaction; (3) how quality is managed; (4) how sustainability is enforced, and finally (5) how channel (power) relations affect the way transaction at primary stages are undertaken.

5.1. How the Nile perch channel is organised in the primary stages

Although the number of fishermen fishing Nile perch is not exactly known, a recent survey indicates that there are about 37,000 fishermen in total in the Kenyan part of Lake Victoria (LVFO, 2000). The channel from landing sites to processing factories involves an intricate buying and selling network (see Figure 1) involving a number of fishermen, fewer middlemen and very few processing factories.

There are primary middlemen. These are middlemen that buy fish directly from fishermen and they are often resident within the vicinity of the landing sites. They often buy fish from one beach as it lands. Primary middlemen do not operate in all the

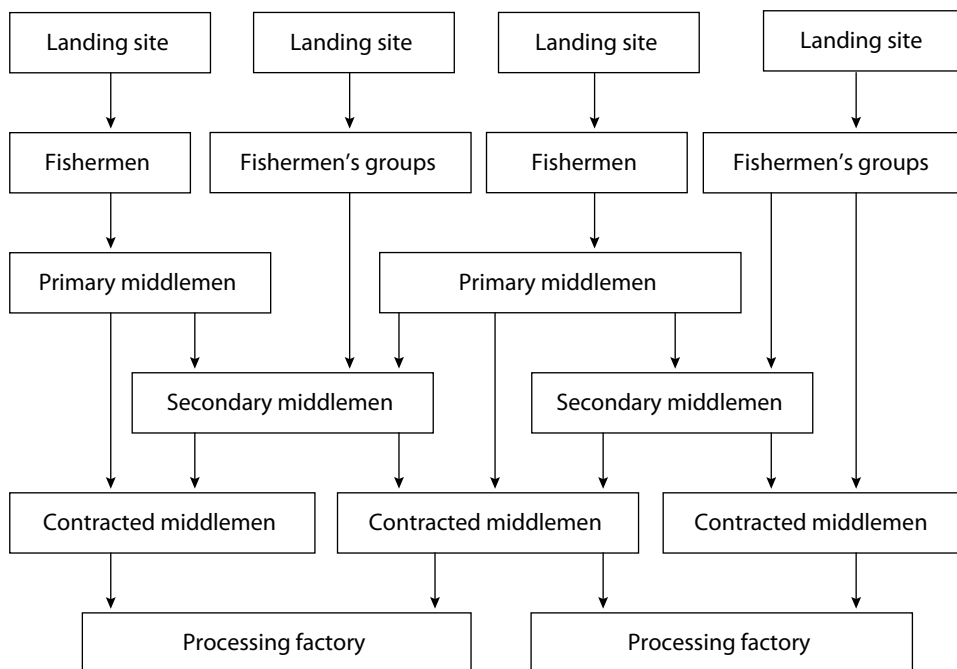


Figure 1. An illustration of the structure of Lake Victoria Fresh Nile perch in Kenya (Field study 2004/2005).

beaches. Out of the eight beaches in the case study, primary middlemen were operating in three beaches. Then there are secondary middlemen that buy fish from primary middlemen and sell to contracted middlemen who then sell to processing factories.

However, it should be noted that the number of middlemen operating in the channel varies from beach to beach. But sometimes there could be both primary and secondary middlemen operating at the same beach. Two of the case study beaches had both primary and secondary middlemen. But at three of case study beaches, fish was being sold directly to contracted middlemen by the fishermen's groups. In such beaches, such groups replace the primary or secondary middlemen.

The presence of primary and secondary middlemen was attributed to: (1) the structural changes that followed the expansion of export markets, and (2) the subsequent decline in fish production. Following the expansion of export markets, some (15,000) domestic fish traders were displaced¹⁷. As a result some of those people end up being employed by middlemen or start to buy and sell fish. As fish catch declines, middlemen buy fish from a number of beaches. Consequently, it becomes impossible for the contracted middlemen to be present in many beaches when fish is landing (which is normally concurrent). Hence contracted middlemen either buy fish from (or employ) secondary middlemen. Some secondary middlemen also buy fish from (or employ) primary middlemen who reside within the vicinity of the beaches such that they buy fish as it lands. These supply networks imply that fish from almost all landing sites goes to almost all factories. Consequently, isolating one channel from another for disaggregate data analysis is difficult at that level. The fact that the same middlemen and hence processing factories buy fish from almost all landing sites corroborates the similarities in the way transactions are undertaken at the landing sites as we discuss subsequently.

5.2. How middlemen and fishermen transact

Transactions between fishermen (or fishermen's groups) and middlemen are predominantly based on informal arrangements, i.e. without written agreements. However, their relations do not only surround fish selling and buying, but also other issues such as credit and social assistance in times of sickness, funerals and food shortages among others. While fish selling and buying is the central bond, the provision of informal credit in form of cash, fishing gears and/or boats by middlemen forms another major tie in their relations. The credit is often given to fishermen who cannot afford to buy fishing gears and/or boats on their own. Such loans are given on condition of exclusive fish supply to the middlemen. Such credit arrangements are however, not unique to Nile perch channel. Similar quasi-credit contracts between fishermen and fish buyers have been reported in India (see for example, Platteau and Abraham, 1987). Although such credit is given on condition of exclusive fish supply

¹⁷ Abila and Jansen (1997) estimate that while 2,400 jobs were created in Kenya factories about 15,000 were displaced in the traditional fish processing and marketing sectors.

to middlemen, the conditions for repayment vary across relationships (see Box 1 for two examples).

Box 1. Examples of payment for informal credit for fishing gears and equipment.

1. One middleman had given a boat engine, a boat and fishing nets to 3 fishers. Each time the fishers landed fish, he (the middleman) got 15% of the catch in payment for the engine, 10% for the boat and 5% for the fishing nets. The remaining 70% of the catch was then shared equally among the 3 fishers and the middleman himself. The middlemen was in turn the only buyer of the fishers' share of the catch.

2. Another middleman had 8 fishers to whom he had given 3 boat engines, 3 boats and nets. In return, the middleman got one day's catch for the engine; another day's catch for the boat, and the other day's catch for the nets. The fishers then got the other three days catch which they shared among themselves. They rest one day a week when they repair the fishing gears or go to church. Even in this case fishers sold their share of catch exclusively to the middleman.

Other conditions were however not clear. For example, none of the fishermen and middlemen interviewed could exactly say when the credit would be fully repaid and gear ownership transferred. Lack of clarity in the terms of credit perhaps highlights the informality of the arrangements. But what was also clear to both fishermen and middlemen was that middlemen were free to withdraw the fishing gears, if fishermen were deemed not cooperative or opportunistic and fishermen were also free to stop using gears if not happy with the conditions.

However it was difficult for fishermen who could not afford for example, fishing gears on their own to stop using the gears anyhow without securing another credit from other middlemen. Hence fishermen tend to be caught up in the credit ties. It was also clear to both fishermen and middlemen that credit repayment could end anytime if the gears were worn out, stolen or rendered dysfunctional in one way or another. In line with this unclear arrangement, middlemen reported that some fishermen deliberately destroy or falsely declare that gears are lost so as to stop credit repayment. In spite of these seemingly exploitative informal credits and in absence of alternative sources of credit (e.g. formal credit institutions for small-scale fishermen), fishermen especially those that cannot afford to buy their own fishing boats and gears acknowledge that such relationships were helpful.

In summary, the upstream Nile perch channel is complex. The fishermen-middlemen transactions are characterised by interlocked fish/credit markets. Although both

fishermen and middlemen benefit in one way or another from such transactions, problems with interlocked factor markets have been documented. For example, Bardhan, (1980) note that interlocked markets compromise the bargaining power of the partners especially those that are dependent on the others. The fishermen's bargaining power is further compromised by the structural power of the middlemen, i.e. their higher concentration gives them more dominance over fishermen.

5.3. Fish quality

At the primary level, we view quality from the perspective of freshness of the fish. Keeping fish fresh requires special technological tools such as ice or cold storage facilities. At the landing sites, the quality of fish determines whether the fish would be sold to the export channel, i.e. through middlemen or to the domestic channel, i.e. through domestic traders who are predominantly women. Fishermen and middlemen use a number of sensory indicators to assess the quality of the fish such as checking colour of gills, eyes, skin and the firmness of the fillet¹⁸. These techniques do not always give consistent results, however. For example, fish could have gills or eyes with a colour indicative of poor quality while the fillet could still be firm, indicative of good quality, i.e. freshness or *vice versa*. Further, one fish could have skin and/or an eye on one side indicative of good quality while on the other side depicting poor quality. Inconsistent quality indicators signify the difficulties fishermen and middlemen face when deciding whether or not the fish is still fresh or not depending on demand and supply. It was reported that middlemen reject more fish on the basis of inconsistent quality indicators when there is more supply unlike when there is shortage in supply. Such behaviour by middlemen in using the quality indicators makes fishermen believe that they manipulate the quality standards to their benefit. Problems in quality assessment and improvement systems are aggravated by a number of factors which we consider as critical quality control points at the primary level: (1) availability of the technological tools and facilities for quality improvement, (2) time to land and deliver fish to the factory, (3) physical fish handling, and (4) type of fishing gears.

Technological tools and facilities: There were virtually no cooling facilities in all the beaches studied¹⁹. In absence of these facilities, fishermen and middlemen (especially primary and secondary) keep fish in sheds with mouths and gills open for air circulation. Sometimes fish is also covered with wet mats or sacks. It was claimed that such techniques keeps fish fresh for relatively longer, for example, for about six hours. The validity of these claims could not be established in this study. However, keeping fish wet for long may lead to discoloration of the skin that in the end, may be interpreted as poor quality.

¹⁸ These techniques are consistent with the Quality index method (Martinsdóttir *et al.*, 2003).

¹⁹ According to Henson and Mitullah, 2003 out of the 300 landing sites in Kenya only 30% have weighing shades, 9% have electricity, 5% have a fish store, 0.3% have a cold room, 20% have access to all-weather roads.

Time to land and deliver to factory: Fishermen rely on wind or manual propelled canoes and so the time to land often depends on the speed and direction of the wind. None of the fishermen interviewed owned a boat engine for fast landing or at-least to counter the problems of strong tides on the lake. Further, due to declining fish stocks, fishermen take relatively longer to catch reasonable amount of fish to warrant landing. In the process, the fish that is caught earlier is subjected to longer period without cooling facilities. On average, fishermen estimated to take about 5–8 hours before landing. However, they sometimes take relatively longer depending on the type of fishing gears and the wind tides on the Lake. For example, hooks are often set in the evening and fishermen go to the lake the following morning to get the fish. Such fish could be landed in the late morning hours depending on the distance to the fishing zones. Fishermen estimated that about 10-30% of fish could be spoiled by the time they land depending on the season—with the high spoilage during rainy season.

Middlemen sometimes take about 2-7 days to buy and deliver fish to the factories depending on the season. This is due to declining supply and intense competition at landing sites. The middlemen do not institute the principle of ‘first come first serve’ when buying fish. Whether or not middlemen were contracted by the same factory, they have independent contracts—implying that they are competitors and so they treat each other like that. Consequently, a number of middlemen buy fish at the same time—each buying less fish per day even if the total landing at the beach could be enough for one or two middlemen. As trucks stay long at the beaches ice constantly melts, thereby reducing the fish to ice ratio.

Physical handling: Our observations revealed that people weighing or loading fish into trucks often throw or step on fish. Those observed throwing fish argued that throwing fish in slanting position may not affect the firmness of the fillet. As one person loading fish into the truck said: ‘If you check the fillet of the fish after throwing it in slanting position or on ice, the fillet remains firm and it is never scratched.’ While these claims could not be verified, throwing fish could reflect limited understanding of how such handling could affect say texture of the fillet from inside. It is also a result of lack of facilities such as basins or wheelbarrows that can be used to carry fish. Damage to the fillet from the inside may not immediately be noticed, unless fish is scratched. Some middlemen, acknowledged they get as high as 10-20% rejects at the factory when fish is filleted.

Type of fishing gears: The types of fishing gears also affect fish quality. For example, fish caught with hooks was reported to have less quality problems (scratches) than fish caught with nets. This was attributed to bruises that are caused when fish is entangled in the net which is not the case with hooks. It was clear from our observation of the fish caught with hooks and nets that differences in amount of fish with scratches were evident.

In summary, problems of lack of technological tools to manage quality are not new. However, even if such tools as ice could be available, not all fishermen could be able

The plight of small-scale primary producers in international Nile perch marketing channels

to take it to the lake, for example, due to the limited sizes of their canoes. Besides, taking ice to the lake when fishermen were uncertain of whether or not they would catch any fish might incur costs of buying ice. As fish stocks decline, fishermen run a risk of coming back empty handed from fishing trips. To minimise delays in landing due to wind problems fishermen may need boat engines. But it is not always that delay is due to wind problems, it is also lack of adequate fish to land. Hence there might not be a one solution to the quality problems at landing sites. It may require more structural and organisational changes and resources to effectively implement and use technological tools to manage fish quality from the boat.

5.4. Enforcing and promoting sustainable fishing practices

Access and use of the fishery is regulated by the Fisheries Act (Kenya Government, 1991). Among other things, the Act outlines the type and size of fishing gears for specific fish species in specific water bodies, and designated fishing places. The Act also outlines the minimum fish size that should be landed, bought or sold and the conditions under which one would be eligible to fish, trade or process fish products. Failure to enforce the Act is punishable by law. The Fisheries Department (FD) is legally mandated to enforce the Act. This section analyses how sustainable practices are enforced by fishermen, middlemen and processors and the FD.

5.4.1. How fishermen, middlemen and processors enforce sustainable practices

That Nile perch fish stocks have declined was undeniable among all participants. The reasons for the decline among others include increased fishing capacity and effort, and increased use of destructive fishing methods. From the discussions, it was clear that actors recognise their roles in the declining fish stocks. For example, among other factors, fishermen and middlemen attributed the increased use of bad fishing gears to coping with declining fish catch in view of limited alternative sources of livelihood in other sectors of the economy. Fishermen argued that with good fishing gears, they run a risk of not catching any fish at all²⁰. This means that without alternative sources of livelihoods, fishermen and their families face hardships to survive. Fishermen also reported that the recommended fishing gears were more expensive (for example about \$30 per fishing net) relative to the bad gears (which were reported to be about \$10). Fishermen also reported that the illegal gears were also readily available in the beaches with others being made locally. Fishermen also noted lack of justice when use of destructive gear was detected by the FD, and biased enforcement of the regulations against fishermen and not on other stakeholders such as buyers (to be discussed in subsequent section).

²⁰ Similar results were obtained in a socio-economic survey in the three countries bordering the lake where more than 60% of fishermen indicated that there would be no catch unless they use small mesh size (see for example Geheb and Crean, 2000).

Middlemen however, shifted the blame to processors arguing that they were buying and supplying what the processors buy. From a marketing perspective, this makes sense in that as suppliers, middlemen buy to supply products that are demanded by customers. The middlemen also blamed some fishermen who they claimed, use small fish as a bait to sell the big fish. Such claims were confirmed during discussions at one of the beaches where a participant said ‘if they only buy big fish then who will buy the small ones?’ Further, there were better economic incentives for middlemen to trade in undersize fish than big fish, as our interviews with one middleman revealed (see Box 2).

Both fishermen and middlemen blamed processing factories for encouraging the malpractices. Although none of the three 3 factories interviewed accepted that they buy undersize fish, they admitted that other processing factories process juvenile fish. While in the beaches, we noted that most factory trucks were loading undersize fish. But when asked about the juvenile fish loaded into their trucks at the landing sites, one factory manager said ‘ask the middlemen, they know where they take the fish to’.

Box 2. Price margins from undersize fish.

One middleman was buying undersize fish from 0.5–1 kg at KSh 40/kg. He was also buying fish of more than 1 kg at KSh 65/kg. During our interview with him the same day, he reported that at the factory fish will be sorted into three groups, i.e. those less than 1 kg, 1-5 kgs and over 5 kgs. Then all the fish of less than 1kg will be sold at to the factory at KSh 55/kg; fish between 1-5 kgs will be sold at KSh 75/kg, and all fish above 5 kg will be sold at KSh 77/kg. Such factory prices lead to a price margin of KSh 15 (55-40) for fish of less than 1kg; Ksh10 (75-65) for fish between 1-5 kgs and KSh 12 (77-65) for fish over 5 kgs. This shows that buying and selling undersize fish give higher price margins.

Note: KSh. = Kenya Shillings (local currency in Kenya).

When asked why the factories do not enforce responsible fishing since the future of their business depends on the sustainability of the fish stocks and moreover that they may easily control the activities of the middlemen, one processor said ‘it can work only if processors work as group and not as it is now where each factory is promoting its own interest’.

In summary, whereas irresponsible behaviour is evident especially with respect to use of bad fishing gears and buying of juvenile fish, reasons range from economic (self interest) gains, pressure to survive and ineffective enforcement by the FD. The need to fulfil personal economic gains may be hard to overcome in absence of alternative mechanisms to compensate the actors. Moreover, in common pool resources such as

the fisheries, where every actor seeks to satisfy his/her interests, compromising such diverse interests to promote a common cause such as sustainability may not be an easy task. Most likely, different resource users have different time horizons within which they seek to maximise gains from the resources. Whereas others may look into the future gains, others may only think of today. Whichever reason, the implications are far reaching for both the design and implementation of alternative policy and governance mechanisms to motivate or enable actors to promote sustainable practices.

5.4.2. *The fisheries department: regulating access and use of the fishery*

There were mixed perceptions about the effectiveness of FD in enforcing sustainable utilisation of the fishery. For example, most fishermen and middlemen wondered why the FD could not close down companies that manufacture illegal gears. However, one fisherman differed with this view arguing that ‘It is not entirely true that companies make illegal gears, but we use the good gears in wrong places or on the wrong fish types.’ While this was an isolated argument during the entire study, it does reflect sense of reasoning about the cause of problem among fishermen. Nonetheless, the common remarks about the role of FD suggest a number of perceptions ranging from lack of commitment, animosity, to leniency in dealing with cases of non-compliance. For example, fishermen reported that the FD does not enforce justice and/or enforce in a biased manner. The following are some of the remarks to qualify fishermen’s perception of the role of the FD in enforcing responsible fishing (discussions in different beaches):

‘They (fisheries officers) know who has illegal gears, why not just get and destroy them?’

‘The fisheries officers can arrest a fisherman for having an illegal fishing gear today, but few days or weeks later, you see him back in the lake using the same gear, what does that mean?’

‘You will never hear that a middleman’s truck has been impounded or a factory has been closed for buying or processing undersize fish—are fishermen the only culprits!’

The Fisheries Act mandates the FD to license all fishing gears as a way of controlling and monitoring access to and proper use of the fishery. The extent to which this is enforced and appreciated for the intended purpose has been questioned. The FD has been blamed for emphasising more on the monetary benefits for the state rather than sustainability and welfare of the local people dependent on the fishery as the following remarks seem to suggest: ‘When government officers come to licence fishing gears, they licence everyone they find, whether they have bad or good gears, they do not care as long as one has the money to pay for the licence fee’, recounted a fisherman during an interview.

Verifying such claims from FD personnel yielded the following remarks: 'I cannot manage to physically check thousands of hooks and nets one by one. I am responsible for many beaches and it is not practical', explained one fisheries assistant admitting to some extent that he licenses some of the gears without certifying that they were of the right sizes e.g. mesh sizes. Previous reports have also blamed the FD for its failure to enforce the law. For example, Geheb (1997) note that: 'The unregulated "free for all fishing" under the government watch to maximise economic gains from export earnings has contributed negatively to sustainability'. Abila (1998) also questioned the purpose of gear licensing as he notes that 'One wonders whether gear licensing is just another way of raising government revenue or really to regulate access to the fishery'.

In short, the problems of ineffective enforcement could be true. However, that does not justify that actors should not to be responsible themselves. Failure for the FD to enforce responsible behaviour amplifies the need to consider alternative mechanisms that may enhance social or market controls among resources users to protect the fisheries. Failure to achieve to develop alternative mechanisms may imply that the fisheries are bound to be depleted. Fortunately, some indications of social control emerging among some fishermen in the Nile per channel as we briefly discuss next.

5.4.3. Emerging opportunities for sustainable practices

Despite these poor perceptions against the FD, fishermen in some beaches have resolved through the BMU's that they should only use recommended gears. During our visits to such landing sites, fish landings were consistently of large size fish. Asked why the fishermen want to enforce responsible fishing instead of leaving it to the FD which has a legal responsibility to protect the fisheries, one fisherman reasoned this way:

'Fisheries officers are employed, they are assured of their salaries whether they help us deplete the lake or not. If there is no fish in this lake, they will be transferred to other lakes. The same with the Indians (factory owners are mostly Indians) they can relocate and continue their businesses in other lakes or countries. No one will transfer us or our problems to anyone or anywhere and the lake is what we have to survive on.'

These are signs of hard found social responsibility to enforce sustainable utilisation among fishermen. The challenge however, is how to sustain the momentum because by using recommended fishing gears, fishermen in these beaches catch less fish relative to those in other beaches who catch even the juvenile. No matter how small their contribution to overall sustainability might be relative to the size of the lake, it might signal a turning point in so far as responsible fishing behaviour is concerned. This hard found social responsibility can be sustained if such fishermen are adequately rewarded for their behaviour. At the moment, these beaches like the rest lack quality management facilities that in turn compromise their bargaining power against

buyers. Consequently, their efforts to enforce responsible fishing are, in our view, not adequately being rewarded. We will elaborate on how lack of technological tools affects the transactions at landing sites in the next section.

5.5. Power relations between fishermen and middlemen

The buying and selling of fish at the landing sites is characterised with buyer dominance, lack of price information for fishermen and also the interlocking of credit and fish markets. These issues affect the transaction relationships at landing sites. These were systematic problems across all the eight beaches. For example, complaints that middlemen use their access to refrigerated trucks and price information to impose low prices were common during discussions with fishermen. Previous reports also indicate that middlemen collude to keep price low to their own benefit²¹. One middleman interviewed at one landing site acknowledged that they sometimes collude to set the price. During one of our visits to one of the beaches we confirmed this allegation (see Box 3 for the details).

Fishermen vulnerability to price fluctuations can also be attributed to the interlocking of fish and credit markets. For example, fishermen once tied with middlemen from whom they obtain fishing gears, they may not adequately bargain for better terms of transactions or else they lose the gears. As one middleman at one beach told us: 'If a fisher is not happy with the conditions for using my gears, I just withdraw them and give to any other fisher, there so many who want fishing gears and boats.'

The consequences of interlocked fish and credit markets on fishermen in the Nile perch chain have been raised previously. For example, Bokea and Ikiara (2000) note that: 'In pricing, fishermen have no say because of lack of storage facilities, the high perishability of fish and the pressure of the credit relationships.'

Similarly, Henson and Mitullah, (2003), note that: 'Given that there are virtually no chilling facilities at landing beaches, processors have to provide ice and insulated trucks and ... whilst they incur significant costs as a result, it also enhances their market power over fishermen.'

In short, one would expect that fishermen, having the fish whose stock is declining and demand increasing, would be in a better position to bargain for better prices. It is not the case when fishermen only have fish, but no price information and no technological tools to manage fish quality. So unless fishermen have the tools to manage the perishability of the fish, they may not be able to bargain for competitive prices from buyers.

²¹ For example Owino (1999) who noted that "agents unite in order to keep the prices low".

Box 3. Agents walk-away to impose low prices.

Upon arrival at one of the beaches, we found 3 contracted middlemen from three factories from and the BMU in a meeting. After a while the meeting disbanded without an agreement which gave us time to talk to both the middlemen and the BMU secretary.

When middlemen arrived at the beach they told the BMU that the factory prices had gone down such that they could only buy fish at KSh 55/kg down from KSh 67/kg the previous day's price. In protest, fishermen refused to sell fish. After some time of negotiation, fishermen offered to sell fish at KSh 65/kg but the middlemen insisted that they could only afford KSh 55/kg. The meeting then disbanded.

During our interview with the middlemen, they claimed that prices at their respective factories had been reduced overnight such that they could not afford to pay what fishermen wanted. When asked to explain the coincidence that the three factories lowered the prices to the same level overnight, 'It usually happens, it's not new, after all these factories belong to the same Indians who collude to fix the prices', was the explanation from one of the middlemen while the other two nodded their heads probably in concurrence. After talking to us the middlemen left the beach without buying fish.

In a separate interview, the BMU secretary reported that they could have believed that prices at the factories had reduced, if the middlemen had shown written evidence from the factories. As the day went by no other middlemen came to the beach as we hanged around to establish how the walk-away could end. Meanwhile fishermen were speculating that other middlemen would not come because 'they must have phoned each other'. We left later in the afternoon before other middlemen came. On our follow up visit to the beach we were told that the same middlemen came back late in the afternoon only to buy fish at KSh 57/kg while some fish had been spoilt. We did not get how much fish was spoilt.

6. General discussion and implications

The objective of this paper was to analyse the challenges facing the small-scale primary producers in meeting downstream quality demand and cope with pressure from declining fish stocks. Specifically the chapter considered (1) how sustainability and coping with quality requirements of (distant) customers should be integrated in a suitable governance system; (2) what they could mean for public and private policy, and (3) if improvement at the primary level is needed, what could be the critical

control points that need to be addressed for assuring quality and sustainability in the upstream. This section discusses the implications of the results of this study in line with these questions.

The study has identified a number of intervention points that may improve quality assurance. For example, unlike the HACCP, that focuses on potential hazards, this chapter shows that lack of proper knowledge about fish quality is an important factor to be addressed in order to improve quality. Lack of proper knowledge is reflected by poor handling such as throwing, beating and stepping on fish. The study also shows that lack of cooling and storage facilities essential to keep fish fresh, the type of fishing gears, and the time it takes before the fish is processed as potential factors that may contribute to quality deterioration. Although these factors are not necessarily hazardous as is the case with HACCP, they are nonetheless important for quality improvement at primary level. These results imply that investment in the quality management facilities such as ice or cold storage facilities in the landing sites or investments in larger boats that can carry ice are needed. This however may require even more structural investments such as electricity that is currently not available in the beaches studied. Poor handling practices could be minimised through educating the fishermen and middlemen on the effect of poor fish handling on quality. It may also require better motivation, for example, better prices for better quality which was not the case. Fishermen may be compelled to handle fish properly if they know that they would be rewarded for it. This means that buyers (middlemen and processors) should be willing to pay for quality.

The results also show that degradation of the fisheries is largely blamed on the use of bad fishing gears which is attributed to high prices for the good gears and ineffective and biased enforcement (against fishermen) by relevant authorities. This implies that public institutions should improve their effectiveness in enforcing sustainable fishing practices and the recommended fishing gears should be made affordable to all fishermen. However, neither the effectiveness of public institutions may improve overnight nor making gears affordable to all fishermen would by itself guarantee that all fishermen would use good gears. But sustainable practices, i.e. use of good gears could be enhanced by a combination of both enforcement and affordability of the gears. For example, by only targeting and punishing fishermen, the fisheries department fails to hold the middlemen and processing factories responsible for promoting unsustainable fishing practices when they buy and process undersize fish. This in turn may frustrate fishermen who might want to implement sustainable practices because they too have economic motives that drive them to use bad gears. Above all, while punishment for wrong doing is a reward for doing good, focussing on the destructive fishermen makes the public institutions fail to recognise and adequately reward the good work that some fishermen are doing. Therefore, a change in the approach on how sustainable practices are enforced might be needed. For example, fishermen that implement sustainable practices should be rewarded through; better prices or through better access to recommended fishing gears, access to storage facilities; access to more profitable markets, i.e. processing factories that may pay them better prices. In that way we believe that other fishermen may follow the good behaviour.

Implementing such incentives may have to start with fishermen that through their BMUs are implementing sustainable practices. The public institutions may support the local institutions that are not only closer to, but also include fishermen themselves. Since the BMUs that implement sustainable practices do so by reasoning with—and motivating—fishermen, the public institutions may wish to work with the BMUs to motivate more fishermen to implement sustainable practices. Supporting the BMUs may take different forms such as establishing micro-credit schemes to enable fishermen registered with BMUs to buy fishing gears at reasonable prices or low interest loans. Having better access to fishing gears would mean that fishermen who use bad gears under the pretext of high prices or lack of credit facilities would no longer have an excuse. Ultimately, social control by fellow fishermen and the BMUs would be more effective and appropriate. Moreover, enabling fishermen to obtain fishing gears through BMUs would enhance their bargaining power like for prices and other terms of transactions unlike interlocked markets in which fishermen lose their bargaining power (Bardhan, 1980).

The results also show that fishermen's position in the channel is compromised by lack of price information and interlocked fish/credit markets. Information asymmetries especially over price lead to abrupt price changes and conflicts between fishermen and middlemen. There is need therefore to create market information systems and institutions through which price information could be communicated to the fishermen rather than the fish buyers, e.g. by sending daily an sms with current prices to subscribed BMU's or fishermen. Such institutions could be through the establishment of a fish marketing institution that could coordinate information flow to fishermen. For example, use of mobile phones by fishermen to access market information is being used in Asia (see *The Economist*, 2001a,b, 2005a,b). However, this can only work better if fishermen were free to decide where to sell fish based on the market prices and other factors such as transactions costs rather than when they are tied up to particular middlemen from whom they obtain fishing gears. Therefore making fishing gears affordable and easily accessible to fishermen would disentangle those that are currently locked up into relationships with middlemen that have given them fishing gears and may decide where to sell their fish.

In conclusion integrating small-scale primary producers into integrated supply chains faces many challenges. Addressing these challenges would imply that either public or private policy or both should invest in the primary stages to enhance the capability of fishermen to compete. That can be achieved through providing them with such investments as quality management tools. They should also invest in making recommended fishing gears affordable for the poor fishermen. Doing so would make higher gear prices not an excuse anymore and social control by responsible local institutions such as the BMU more effective. Above that, private and public policy should strive to improve the socio-economic environments so that fishermen who use survival as an excuse for using destructive fishing should no longer have an excuse.

7. Study limitations

This study is a result of intensive discussions, interviews and observations in eight beaches in Kenya. Although further visits and observations in many other beaches suggested more similarities than diversities in the mode of transaction, the results should cautiously be generalised to other beaches beyond those directly involved in the study. This therefore brings an opportunity to undertake similar extensive as well as intensive situational analyses in the sites not reached with this study. As the study is exploratory, no theoretical hypotheses were envisaged.

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Quality management and governance in pork processing industries in China

Jiqin Han, Jacques Trienekens, Tao Tan and S.W.F. (Onno) Omta

Abstract

The agricultural sector is changing toward more close coordination between the different stages of the supply chain. Consumers' stringent demand on more safe and higher quality products is one of the reasons that contribute to this change. This paper is aimed at examining relationships between organisational arrangements, quality management practices and firm performance of pork industries in China. Data collected from 218 pork processors in China were used to study these relationships with a focus on the upstream part of the pork supply chain. Structural equation modeling (SEM) techniques were used to test the model. Our research findings indicate positive relationships between (more integrated) governance structures and (more intensive) use of quality management practices and between use of quality management practices and firm performance. However, our study did not show a significant relationship between more integrated governance structures and better firm performance. Conclusions and managerial implications are drawn from the analysis pointing at the development of closer supply chain relationships between suppliers and processors in the pork supply chain in China.

1. Introduction

In the past two decades, organisational arrangements in the agricultural sector in developed countries have been moving from spot market towards more close coordination. As the pork industry is concerned, the vertical coordination systems between livestock producers and processors in most Western countries have dramatically shifted toward long-term contract coordination or vertical integration (Lawrence and Hayenga, 2002). Among a number of driving forces for this shift are the level of risk faced by agricultural producers, stringent quality requirements for processing and changes in technology (e.g. Fearne, 1999; Hobbs and Young, 2001). Moreover, more than ever before, consumers are demanding food to be healthy, safe and environmentally friendly. This implies that the competitiveness of pork production in many cases depends more on the supply of safe and high quality products than on quantity and prices.

China is the largest pork producer in the world. However, its export only accounts for about 1% of domestic production volume. It is recognised that the quality and safety of the pork products are not up to the standard of importers. With the rapid

economic development in China, food safety and quality is increasingly becoming an issue of concern for its consumers. This poses challenges to the organisation of pork supply chains in China. Pork processing companies are endeavoring to establish closer cooperative links with their suppliers and downstream customers in order to be competitive in the market.

Past studies in industrial organisation theory have focused on the relationship between transaction attributes and the selection of different organisational arrangements. Relatively little research has been done with regard to the influence of different organisational arrangements on the implementation of quality management practices, nor with regard to whether closer coordination contributes to firm performance. Empirical research shows mixed results on the relationship between quality management practices and firm performance. In this paper, we use empirical data from the pork slaughtering and processing sector to analyse relationships among organisational arrangements, quality management practices and firm performance.

The layout of the chapter is as follows: the next section introduces pork supply chains in China, with emphasis on sources of quality problems and quality management systems. The third section describes the theoretical constructs organisational arrangements, quality management practices and firm performances, as defined in this paper. Hypotheses will be formulated based on literature on transaction cost economics (TCE), quality management and firm performance. The fourth section describes research method and results of an empirical study on Chinese pork processors in east China. Finally, the chapter concludes with implications for the development of more effective and efficient pork supply chains in China.

2. Pork supply chains in China

2.1. Overview of production, processing and retailing of pork

Fundamental changes have taken place in the Chinese pork industry since the government removed state procurement quotas and price control in 1985. Since 1990, China has become the largest pork production and consumption country in the world. The total output of pork production reached 47.02 million tons in 2004, accounting for approximately 46.8% of the total world pork production (China Statistical Yearbook, 2005). The second largest pork production country in that year was the USA, with an output of 10 million tons, accounting for nearly 10% of total world pork production (USDA report). China is also the largest pork consumption country. In 2002, pork consumption in China accounted for 50.8% of world pork consumption, with an average *per capita* consumption of 33 kg. However, among the main meat varieties pork, beef, mutton and poultry, the proportion of pork consumption decreased from 85% in 1985 to 69% in 2004 (see Figure 1), although the outbreak of bird flu made pork consumption rebound in 2005. Although pork consumption has the tendency of decreasing in the last two decades, it is still the most popular meat in China.

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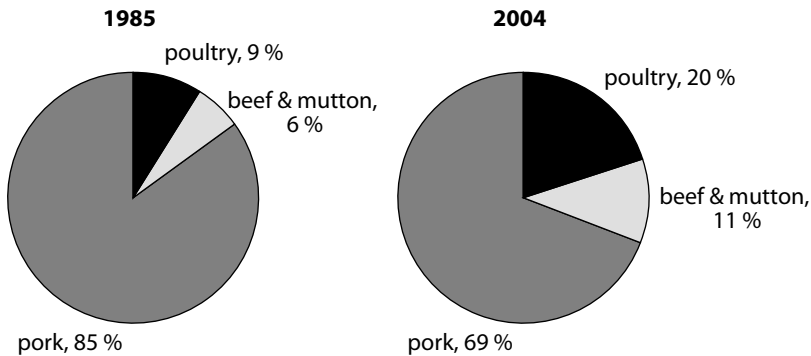


Figure 1. Comparison of meat consumption structure in 1985 and 2004. Source: China Statistic Yearbook (1985 and 2005).

Despite the rapid development of the processing sector, only 15% of the pork is processed into packaged cuts and chilled meat, with the rest sold as fresh and frozen meat in the retail market. Out of that 15%, less than 27% is cooked meat, including traditional ham, cured meat, Western flavored ham, sausage and bacon, etc. (Pan and Kinsey, 2002).

Contrary to the USA, the Netherlands and other developed countries, China's leading position in pork production is accomplished by a large number of small farmers. Many backyard-households raise only 1 to 5 hogs in simple housing (Pan and Kinsey, 2002). Figure 2 depicts the general picture of the pork supply chain in China.

China's pork supply chain has the following characteristics:

1. A large number of small household hog production. Although commercial operations and specialised companies are growing, they provide only about 20%

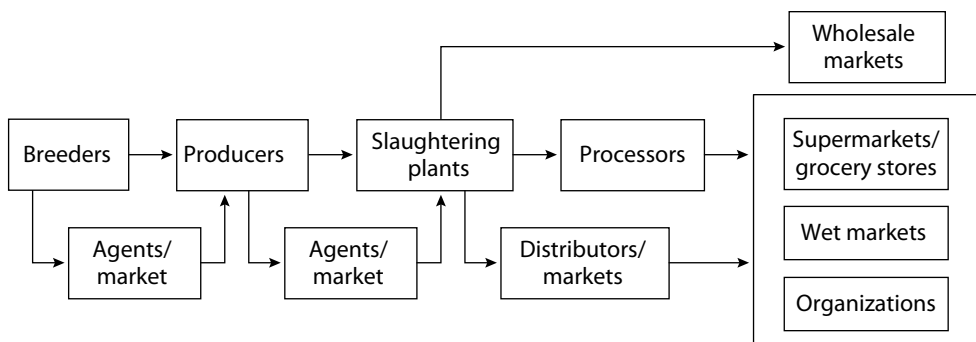


Figure 2. China's pork supply chain. Adapted from Pan and Kinsey (2002).

of all hogs in China. The remaining 80% of the hogs are provided by backyard farms (Pan and Kinsey, 2002), implying production arrangements inducing high transaction costs. Slaughtering plants or processors depend on traders to collect hogs from small farm households to acquire a sufficient lot size.

2. Large numbers of small slaughterhouses. To regulate meat slaughtering, the Chinese government issued the 'Regulation on the Designated Pork Slaughtering' in 1998, with the aim that hogs should be slaughtered in these designated slaughterhouses. According to the Standing Secretary General of the China Meat Association, there were altogether about 30,000 designated meat slaughterhouses in China. Among them, only 7% are regarded as 'scale' companies²² (Deng, 2005). As pork production and consumption is still the main source of animal protein for Chinese consumers, pork slaughtering and processing firms accounted for eighty percent of the 30,000 designated meat slaughterhouses.
3. Short-term spot market transactions between buyers and producers. Previous empirical research has indicated that traditional spot market transactions were still the most popular governance form for farmers selling their hogs (Zhou and Dai, 2005). This brings uncertainty in quantity, quality and price to the processors on the one hand, difficulty in making decisions on production and marketing to the producers on the other hand.
4. Beside the difficulties of the collection of hogs, it is difficult for the slaughterhouses and processors to monitor the processes of hog production. Barriers also exist in the application of modern technology in hog production due to limited education of most of the producers. Low quality and sanitation standards from these backyard productions prevent pork industry from gaining competitive advantage and entering into the world market. The lack of monitoring of small producers induces potential quality and safety problems. It is widely believed that lack of monitoring leads to high drug residues and the existence of illegal slaughterhouses (Pan and Kinsey, 2002; Pan, 2004).

In recent years, leading meat-processing companies like Shineway and Yurun Co. Ltd. have established closer vertical coordination with retailers through franchise and long-term contracts (Zhou and Dai, 2005) and invested heavily in developing cold chains and providing consumers with brand products.

2.2. Quality management in China's pork supply chain

According to Martinez and Zering (2004), pork quality refers to a set of characteristics that make meat desirable. Consumer characteristics are determined by: aesthetics (taste, smell, texture and color), nutrition (vitamins, protein, minerals, energy, type and proportion of fat); safety (absence of pathogens or toxins); intangible quality (organic, or meat produced under high standards of animal welfare); and qualities such

²² The classification of the meat companies is not well developed in China at the moment. "Scale Companies" is usually used to refer to those companies with annual sales of more than RMB 5 million Yuan (approximately 625,000 US dollars).

as convenience and reliability. Pork processors identify several other determinants of pork quality: low 'drip loss' or fluid lost from fresh, uncooked pork; color and color consistency; limited external fat and absence of defects (Morgan *et al.*, 1994).

When asking Chinese consumers the definition of pork quality, they usually think of safety, eating quality, healthiness and price. In a consumer survey carried out by a research team of Nanjing Agricultural University in east China in 2005 (EU Small Projects Facility Program Team, Nanjing Agricultural University), safety was mentioned as the most important element for consumers when purchasing food. Nutritional value and flavor came next. Experience plays an important role in buying pork products. If consumers encounter a brand of bad quality once, they will not buy that product again. Only well-educated consumers are aware of traceability, wholesomeness and technological quality aspects.

Quality and safety of pork products depend on the well functioning of quality control systems and the efficiency of its operations. After the accession into the WTO, the Chinese government has been making great efforts in bridging its meat control system with the international standards. However, China has a complicated monitoring and inspection system for pork safety and quality control. Every stage of the pork supply chain has its own governmental institution(s) responsible for quality and safety. Furthermore, more than one governmental institution is involved in one particular stage of the chain. This induces considerable overlaps in their responsibilities. Liu *et al.* (2004) described in detail the legal institutional framework for food safety and the responsibilities of the main governmental departments involved in the monitoring and inspection of food quality and safety in China. A brief introduction of these governmental departments is given in Box 1 below.

Box 1. Main government institutes involved in quality regulations and inspection.

Institutions involved in food safety and quality in China are various. Major players include the National People's Congress (NPC), the State Administration for Quality Supervision, Inspection and Quarantine (AQSIQ), the Ministry of Agriculture (MOA), the State Environmental Protection Administration (SEPA), the Ministry of Health (MOH), the State Administration for Industry & Commerce (SAIC), the State Food and Drugs Administration (SFDA) and the Ministry of Commerce (MOC). The NPC is the top-level legislature in China that makes laws concerning food safety and quality control. The State Council has a close cooperation with NPC on law and regulation issues through its Law Office. The State Council, the AQSIQ, MOA, SFDA and SEPA are responsible for drafting laws and regulations on food safety and quality. The MOH particularly deals with the safety and quality of processed products. The SAIC monitors and manages all market places, including wholesale and retail markets. The Ministry of Commerce (MOC) is mainly responsible for

formulating development strategies, guidelines and policies of domestic and foreign trade and international economic cooperation, drafting laws and regulations governing import and export business, etc. In October 1999, MOC established the Slaughtering Technique Identification Center to regulate animal slaughtering and improve meat safety and quality.

Common quality assurance systems in food production are Good practices (e.g. Good Agricultural Practices and Good Manufacturing Practices), Hazard Analysis of Critical Control Points (HACCP) and International Standard Organisation (ISO). Good practices and HACCP mainly focus on assurance through technological requirements, where ISO is more focused on management (Luning *et al.*, 2002). Since the 1980s, the Chinese government has issued more than ten GMPs for food industry, including the General Hygiene Practices (GB 14881-1994). With more strict TBT (Technical Barriers to Trade) regulations since China's accession into the WTO, more food industries have realised the necessity to implement GMP and HACCP. Comparatively speaking, the accreditation of GMP and HACCP started quite late in the meat slaughtering and processing industry compared to other food industries in China (info.china.alibaba.com). Our 2005 survey amongst 187 pork processing companies (see also section 4 of this article) shows that only 30% of the companies applied HACCP, 40% applied ISO 9000 and only 7% applied ISO 14000.

Efforts from retailers to improve food quality and safety in Europe can be illustrated by the well known retail standards Eurep-GAP and British Retail Consortium (BRC). In China, there isn't any initiative from retailers as a group up to now. However, with the development of supermarket chains and the increase of incomes in China, some modern pork companies have been developing closer relationships with their upstream suppliers and downstream customers. They have invested to have their own pig production farms and retail stores. Besides, also contracts are more often applied in doing business.

The next section goes into theoretical considerations regarding the relationships between governance and quality management.

3. Governance, quality management and performance

3.1. Transaction costs and governance structure

In Transaction cost economics (TCE) the transaction is the unit of analysis. It focuses on 'transactions and the costs that attend completing transactions by one institutional mode rather than another' (Williamson, 1975). The theory's central claim is that transactions will be handled in such a way as to minimise the costs involved in carrying them out (David and Han, 2004). Williamson (1991a) identifies

three alternative forms of transaction governance: market, hybrid and hierarchy. TCE maintains that there are 'rational economic reasons' for choosing the means of governing transactions (Williamson, 1985). It is what Williamson (1991b) called the 'discriminating alignment hypothesis', which holds that transactions, which differ in their attributes, are aligned with governance structures—i.e. market, hybrid or hierarchy—in a discriminating (i.e. transaction-cost-economising) way. Therefore the governance mode that minimises transaction costs is the preferred option.

Empirical work based on transaction cost analysis has produced modest evidence of the governance efficacy of hybrid governance (vertical coordination) in inter-firm relationships (Buvik, 2002). Our study will pay special attention to these hybrid governance forms in pork chains.

3.2. Governance structure and quality management

TCE offers one perspective on the relationship between market organisation and product quality. One class of transaction costs are measurement, or information costs (Hobbs, 1996). These include costs of searching for information about buyers or sellers in the market, inspecting goods prior purchase, and assigning a price. Markets may be organised to reduce measuring costs that are associated with assuring a closer correspondence between product value and price, or actions and rewards (Williamson, 1985). When hog quality attributes are difficult to measure the producer may engage in opportunistic behaviour to exploit private information by failing to perform as agreed, such as shirking or cutting corners on quality, also referred to as moral hazard. This is expected to lead to contracts with added security features to mitigate the hazard (Martinez and Zering, 2004). In this regard, two packer surveys in the USA in 1996 and 2001 respectively, showed that related to hog quality and consistency, contract forms of governance performed better than spot market forms of governance (Martinez and Zering, 2004).

3.3. Quality management and firm performance

To cope with the competitive environment, many companies have applied quality assurance systems. The importance of quality management and its associated benefits such as improvements in customer satisfaction have been well acknowledged (e.g. Hendricks and Singal, 1997). Madu *et al.* (1995) studied QM practices in Taiwan's manufacturing firms. They found a significant causal relationship between quality dimensions (i.e. customer satisfaction, employment satisfaction, and employee service quality) and organisational performances. In their research on total quality management practice and outcomes in large US firms, Mohrman *et al.* (1995) found that 83% of the surveyed companies had a 'positive or very positive' experience with QM, and 79% planned to 'increase or greatly increase' their QM initiatives in the next 3 years. A number of articles offer insights on the critical success factors in quality management. For example, Saraph *et al.* (1989) reported that eight critical factors could be used for QM assessment, namely the role of the quality department, training,

product/service design, supplier quality management, process management, quality data and reporting, and employee involvement. Supplier quality management can be considered a key success factor as quality of raw materials input is a basic constraining factor for quality of end-products of a company. Growing industry attention for supply chain management has also increased attention for inter-company quality management systems. In this respect, Kuei *et al.* (2001) note that the focus of the quality-based paradigm has shifted from the traditional company-centered setting to complete supply chain systems.

We hypothesise that in Chinese pork industries inter firm governance forms are strongly related to arrangements between firms on product and process quality.

3.4. Firm performance

In the literature of performance much attention has been devoted to three main streams: financial, organisational and strategic. Organisational theory offers three approaches to measure organisational effectiveness or performance (Murphy, Trailer and Hill, 1996), namely goal-based approach, system approach and multiple constituency approach. After comparing different measures of performance, they suggest that multiple dimensions of performance should be considered where possible, including both financial and non-financial measures. Accounting-based indicators, with efficiency, sales growth rate and profitability (e.g. return on sales or on investments) are the indicators most commonly used (Murphy, Trailer and Hill, 1996). In addition, operational (non-financial) performance measures, such as product quality and market shares are often examined. Our research uses both financial and non-financial indicators to measure performance. As it is difficult to get the exact measurements for indicators such as market share and profitability, we use subjective measures, asking respondents about their perceptions.

This study will explore the relationship between governance structure, inter-firm quality management and performance of pork processing firms.

4. Empirical study

4.1. Conceptual model

In the above-mentioned theoretical overview, we examined theoretical background and relationships between the main constructs that we are going to study in our research. In accordance with the literature review in the previous section, we can develop our conceptual model as shown in Figure 3.

The empirical study of Zhou and Dai (2005) showed that contracts are not commonly used in current pork supply chain management. However, some large meat processing firms tend to use contracts more often to guarantee the quality of meat products

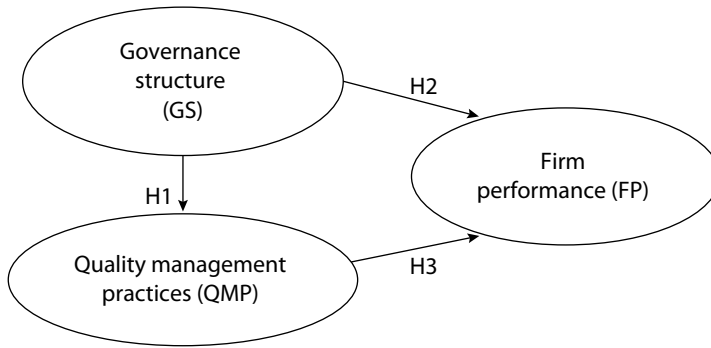


Figure 3. Conceptual model - Structural equation modeling.

and develop high quality brand products. In developed countries several authors have identified increasing requirements of large retailers and fast-food companies concerning product quality and traceability as important drivers towards more integrated food supply chains (e.g. Den Ouden *et al.*, 1996; Lawrence and Hayenga, 2002). It is well acknowledged that contracts and vertical integration being the dominant governance forms in the pork supply chain of the USA and Denmark, contribute greatly to their leading position in the world as major high quality pork producing and exporting countries. Therefore, it is hypothesised:

H1: Pork processing companies purchasing through contracts will pay more attention to quality management than companies purchasing through spot market.

One fundamental assumption underlying the transaction cost analysis perspective is that the alignment of governance forms does reduce transaction costs (Williamson, 1985). An empirical study of Lawrence *et al.* (1997) showed that both market sides, i.e. farmers and slaughterhouses, saved transaction costs through contracts and vertical integration in the USA. Under stable and long-term business relationships between the producers and processors, it is possible to reduce uncertainty and lower searching costs without losing specific investment. Empirical work has also confirmed that investments in transaction related specific assets are often correlated with superior performance (Parkhe, 1993; Dyer, 1996). Therefore, it is hypothesised:

H2: Pork processing companies purchasing through contracts have a better performance than companies purchasing through spot market.

Rich studies are available with regard to the relationship between quality management practices and firm performance. For example, Kuei *et al.* (2002) reported that the organisational performance of enterprises could be improved, differentiated by the following quality related variables: processing management, supplier selection and training on statistical methods in the process of quality management process. Tracy

and Vondermbse (1998) also confirm that improved supplier performances on delivery time, shipping damage and inbound component quality have positive impacts on manufacturing performances. Their results indicate that the levels of QM practices and supplier involvement do relate to performance. It is therefore hypothesised:

H3: There is a positive relationship between the use of quality management practices and performance of pork processing firms.

In the next part, we will discuss our empirical study to test these hypotheses.

4.2. Population and sample

As China is very large, we concentrated on two provinces and one municipality in east China to make the survey feasible, namely Shandong province, Jiangsu province and Shanghai municipality (under the direct jurisdiction of the central government). Visits were paid to government agencies with relevance to pork production, supply and distribution in order to get a name list of pork slaughtering plants and processors. Lists of members of meat associations in the two provinces were used. It was learned from the Jiangsu Meat Association that their members were usually large and medium size companies. However, the current Chinese pork-processing sector has a great number of small companies. Taking Jiangsu province as an example, there are altogether about 1500 designated pork slaughterhouses and processing firms. Among them, 60% are small ones with annual sales of less than 5 million Yuan. A similar situation prevails in Shandong province and Shanghai. In the actual survey special attention was also given to the smaller slaughterhouses. Lists of small pork slaughterhouses, therefore, only could be obtained through the Designated Hog Slaughtering Administration Offices in each township and at county level.

4.3. Measures

The measurement items in this study are, to a great extent, developed from previous empirical studies in order to achieve a high degree of validity and reliability. For example, questions on quality management practices were mainly derived from Saraph *et al.* (1989), and questions on firm performance mainly from Claro (2004). The construct of quality management practices is measured by management leadership, supplier quality management, product/service design and process management. The construct of firm performance is measured by growth rate, market share, profitability and customer satisfaction. A survey questionnaire with above-mentioned constructs (see appendix) was designed in English by using a 7-point interval rating scale system, with 7 equaling the highest extent or degree. The questionnaire was then translated into Chinese. To validate the equivalence of the translation, one person translated the questionnaire into Chinese and another back-translated into English. The original and back-translated versions were compared for conceptual equivalence and refined where necessary (Lai *et al.*, 2005). The questionnaire was sent to 10 academics from the departments of agricultural economics, meat sciences and animal husbandry at

Nanjing Agricultural University for a pre-test. Visits to 8 pork-processing companies of different sizes in Jiangsu province were also made and panel discussions were performed with managers of these companies about the questionnaire items. Further refinement of the survey questionnaire was conducted on the basis of the feedback from these academics and professionals. The revised questionnaires were then sent to 10 local pork slaughtering plants in Nanjing. Telephone calls were made by Nanjing Administration of Pork Designated Slaughtering Plants to remind them to do the questionnaire. After about one month, all 10 questionnaires were returned. The item and scale reliability of the questionnaire proved to be high in this pilot test.

4.4. Data collection

During the pre-test period, it proved to be very difficult to get questionnaires done by meat processing companies through mailing. The companies in China are not used to do mail questionnaires. Therefore the survey was carried out through face-to-face interviews by students majoring in marketing, management and animal sciences at Nanjing Agricultural University. Four training sessions were organised for students who were willing to do the survey. Each lasted for approximately two hours. The students were divided into small groups to improve the effectiveness of the training. A written guideline on how to do the survey was distributed to the students. After explaining the research background and all the questions, students were asked to work in pairs to practice, in roles as respondent and interviewer.

After a better insight in the distribution of pork slaughtering and processing firms in the two provinces had been obtained in the pretest, a stratified sampling technique was deemed as appropriate to collect the data. Cities on regional and township levels have more pork slaughtering and processing companies of various sizes, whereas at county and village level small scale slaughterhouses are dominant. 88 cities at the regional and township levels in Jiangsu and Shandong provinces were selected for the survey. As Shanghai only has one county under its jurisdiction, the whole urban area of Shanghai was selected for the survey. Students were taught to use the method of systematic sampling techniques for selection of slaughterhouses.

The interviews were performed during the winter and summer vacations in 2005 in previously described areas, namely Jiangsu province, Shandong province and Shanghai municipality. Two rounds of telephone contacts with students were made during the survey in order to monitor the process and answer questions. The surveys produced 187 questionnaires. Among them, sixteen questionnaires were not completed by the processors and therefore were useless. At the end of 2005, another 56 questionnaires were returned with the help of the meat association of the two provinces. Among them, nine were useless. Therefore, the sample base for the statistical analysis was 218 questionnaires filled in by the pork slaughtering and processing firms. For this chapter only part of the data from the questionnaires is used: data related to governance choice, quality management practices and firm performance. Data obtained on investments, logistics, information systems, firm's strategy, etc. are not discussed here.

4.5. Data analysis and results

For testing the proposed hypotheses of this research, we conducted data analysis in three stages. In the first stage, the reliability of each scale of the constructs was estimated by calculating Cronbach alpha. Reliability measurement of the three constructs resulted that none of the items in the constructs 'governance structure' and 'firm performance' had to be eliminated, as the perceived scales had acceptable levels. The value of alphas was 0.853 for governance structure and 0.779 for firm performance, higher than the threshold value of 0.7, indicating good reliability of these constructs. As the construct 'quality management practices' has four (groups of) variables identified from literature, namely management leadership, supplier quality management, product/service design and process management, we first examined the reliability of each scale. Our analysis showed Cronbach alphas of 0.888, 0.560, 0.713 and 0.734 respectively. After deleting the question leading to low item-total correlation in 'supplier quality management', we found out the value was increased to 0.762, a satisfactory reliability value. The main problem of the question 'we provide our most important suppliers with feed and technology in order to get good quality hogs' was that this was not a common practice in the pork processing industry. Thus all three constructs passed through the reliability test.

The second stage was to examine unidimensionality, and convergent and discriminant validity of measurement items. Confirmatory factor analysis (CFA) was conducted for structural equation modeling analysis. The evaluation of the goodness-of-fit has several indicators. The common ones include CMIN/df (discrepancy/df in our study), probability value, Normal Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) and Tucker-Lewis Index (TLI indicator). As sub-constructs of 'quality management practices' had more than one item scales, we first examined the overall fitness of this sub-construct. This first-order model as a whole had a satisfactory fit to the data ($X^2=350.85$, NFI=0.965, CFI=0.973, TLI=0.961, RMSEA=0.058). Therefore, construct validity could be examined using CFA for all the construct measures included in this study. The results provided support for construct validity for the measures we used in the study ($X^2=244.33$, NFI=0.967, CFI=0.907, TLI=0.960, RMSEA=0.076, $P=0.000$). Although RMSEA was higher than the recommended 0.05, it was acceptable.

The next stage was testing of the structural model by Structural Equation Modeling (SEM). AMOS 4.01 software (Byrne, 2001) was used to test the measurement models and the research (structural) model. SEM is one of the most applied and consolidated means of testing relations and causality in the field of buyer-supplier relationships (Malhorta *et al.*, 1999). The advantage of SEM over standard regression analysis is its explicit consideration of the measurement error in the indicators and simultaneously estimation of a system of structural equations. Moreover, SEM is a powerful method for testing causal models, because it enables the simultaneous evaluation of the individual paths constituting the model, total effects and the complete model's goodness-of-fit (Hair *et al.* 1998). Table 1 shows the results.

Table 1. Results of confirmatory factor analysis.

Hypotheses	Path coefficient	S. E.	P value	Results
H1: GS à QMP	0.894	7.516	0.000 ^a	supported
H2: GS à FP	-0.52	0.388	0.094	rejected
H3: QMP à FP	1.144	4.252	0.000 ^a	supported

^aP<0.01.

The hypothesised relationship between governance structure and quality management practices for the upstream pork supply chain is positive and significant ($\beta=0.894$, $p<0.01$), which supports H1. This implies that the closer vertical coordination between pork processors and their suppliers contributes to the implementation of quality management practices in pork processing companies. Surprisingly, the impact of governance structure on firm performance of pork processors was negative and not significant ($\beta=-0.52$, $p<0.10$), indicating that H2 was rejected. This means that the performance of pork processing companies applying vertical integration is not higher than that of the companies applying contracts or spot market transaction. We will try to explain this in the discussion section. Significant positive relationships have also been found between the implementation of quality management practices and firm performance (H3) ($\beta=1.144$, $p<0.01$). This indicates that investment in the various practices of quality management may significantly improve performance of pork processing companies. With the increasing income of Chinese consumers in a differentiated market, quality pork products are becoming more and more important.

4.6. Discussion of empirical results

The primary purpose of this chapter was to investigate the relationships among quality management practices, governance structure and firm performance of pork processing companies. Through literature review a hypothesised structural model was established and tested. The implications of the results for researchers and practitioners are discussed in this section.

The findings support positive relationships between more integrated governance forms and use of quality management practices in pork processing companies in China. This was in line with the findings of Martinez and Zering (2004) in the USA, contracting between pork packers and producers in the USA has increased considerably since the 1990s. Marketing contracts accounted for approximately 69% of hogs sold in 2004, compared with less than 2% in 1980. One of the main reasons is the changing emphasis on pork quality by consumers. Den Ouden *et al.* (1996) also identified increasing quality requirements of customers as a major driving force for contracts and vertical integration. In our survey, we noticed that vertical integration was not

commonly applied by pork processors. Even for those who applied this governance form, the percentage of hogs purchased was rather small. For example, the largest pork processor in Jiangsu province, Yurun only had about 1% of the hogs from its own farms. Half of their hogs were provided by suppliers who had marketing contracts with farmers or agents. The length of the contracts varied from one month, half a year to one year depending on price, quality, quantity and transportation demands. The remaining part of the purchase was based on oral agreements. The other distinctive finding we obtained from our survey was the differentiation of governance forms for different consumer markets. Pork processors use hogs (meat) purchased through more coordinated governance forms to produce high quality products for hotels and big restaurants. Their demand on the quality of the products was one of the main driving forces.

Lawrence *et al.* (1997) indicated the benefits of contracts and vertical integration through empirical studies. Their research findings showed that both market sides, i.e. farmers and slaughterhouse, saved transaction costs through closer governance forms. They argued that under the situation of high quality of pork and consistent supply, long-term contracts allowed transaction cost savings compared to traditional marketing channels. However, in our research we found a weak ($p < 0.1$) negative relationship between governance structure and firm performance for Chinese pork processors. Previous studies actually also doubted the positive relationship between governance structure and performance (Bello *et al.*, 1997). They argue that the importance of transaction costs is overstated. The observed patterns of firms' governance structures suggest that firms also account production costs and strategic considerations to determine efficiency boundaries. A possible explanation is that current pork products still belong to commodity produce. Price is still the main competition mechanism. Because it is not difficult to get sufficient supply of hogs in the current situation in China, spot market transactions seem to be a good choice for most of the processing companies. Another explanation is related to the current hog production system in China. As already illustrated in the previous part, the majority of hogs are produced by small household farmers. For processing companies, the transaction costs would be rather high if they had to contract a large number of small farmers. Previous studies have also shown that contracting was highly correlated with size of farms (Key, 2004). It was also found in our survey that pork processors usually only sign contracts with large suppliers. Moreover, it is difficult to enforce contracts because the current juridical system has not been well established. It would not only be costly to reach agreements with suppliers, but also to monitor the implementation of the agreement. Therefore, the spot market is still the dominant way of transaction used by most processing firms in China.

The findings suggest a positive relationship between the extent of quality management practices and performance of pork processing companies in China. They are consistent with many previous studies, i.e. Douglas and Judge (2001) and Kaynak (2003). It is worthwhile to mention that 'quality management practices' was operationalised as a single construct in our proposed structural model. Interrelationships among the five

quality management variables are not investigated. Therefore our discussions mainly focus on the impact of quality management practices on firm performance.

However, our survey findings also indicate that long-term quality strategy and quality management schemes (e.g. HACCP and ISO series) are critical to firm performance in the pork processing sector. As pork products have very strict requirements on temperature control, a well-developed cold chain from production to marketing is very important, because the logistics system is not well-established in the current pork supply chains. According to TQM, the most critical factors of successful quality management implementation are management leadership and commitment, open organisation and employee empowerment (Luning *et al.* 2002). When hierarchical management systems still prevail in organisations in China, it is important to get middle management and shop-floor employees actively involved in the implementation of quality management practices. Employee training in quality awareness, and handling production procedures and operation standards, as well as the establishment of a reward system for quality improvement suggestions, are important to reach superior quality management. Supplier quality management also emerges as an important component of TQM, directly and positively affecting product/service design and process management (Kaynak, 2003). It was one of the five variables in quality management practices in our research model. Supplier involvement and optimisation in quality management of pork processing companies can leverage supplier capacity and improve firms' performance and lead to sharing of risk for reducing quality uncertainty. Chinese pork processing companies also found that the selection of suppliers based on quality more than just price helps them to guarantee supply of high quality hogs (meat). Meanwhile, incentive application to suppliers devoted to quality management and strict monitoring of incoming hog (meat) supply are also critical in quality management in China.

The confirmed positive effect of quality management practices on firm performance (H3) in this research is very encouraging for practitioners. It reaffirms the role of quality management in improving firm performance and provides impetus to the managers of various levels of pork processing companies to continue adopting quality management practices in their organisations. As many companies put it 'Quality is the life of the enterprise', firms that wish to improve their performance should invest in quality management. Quality management practices that have been elaborated in this study are: in-company quality management, supplier quality management, employee involvement in quality management, product/service design and process management. Further analysis of our data can provide valuable information to those companies who are endeavoring to implement total quality management. The indicators may serve as instructions as where they should go.

5. Conclusions and direction for future research

This study represents one of the first empirical studies with regard to upstream pork supply chain management in China. It aimed at investigating the relationships among governance structure, quality management and firm performance of the pork supply chain. Based on literature review, a hypothesised structural model was developed and tested. The research results generate some significant theoretical and managerial implications.

The theoretical significance is mainly due to the following two aspects. The first is that this research tried to extend empirical evidence to the relationship between governance and firm performance. Extant research (including empirical studies) mostly focuses on the explanation of the relationship between transaction cost attributes and the selection of various governance forms. This research goes one step further by including quality management practices and firm performance in the equation.

The confirmed two hypotheses in this research have significant implications for processing firms in China. To improve quality of the product and reduce uncertainty in hog supply, the companies should develop close relationships with their suppliers. In the survey, we found that in most cases large and medium-size pork processing firms started to use contracts with their most important suppliers. By doing so, they could reduce the costs of searching for adequate suppliers, acquiring higher quality hogs with specific attributes, with the ultimate aim to satisfy consumers' requirements on pork quality and achieve better performance. More specifically the research generates the following important implications for the various stakeholders in the pork supply chain:

- Firms should forge strategic partnerships and develop closer coordination relationships with their suppliers. By establishing close and long-term buyer-supplier relationship, firms can improve their quality management.
- Attention to quality management is critical to improve customer satisfaction and bring benefit to the company. Quality management needs vision from management and participation by all employees of the company. And furthermore, quality management should be applied throughout the supply chain.

This study focused on the relationships between upstream parties of the pork supply chain. Further empirical research should be conducted to gain more insight into the relationship between processors and retailers.

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Appendix 1.
Multivariate scales of the constructs in the study

Measures	Descriptions
Governance structure	
Spot market	Most of hogs (meat) are purchased though spot market transaction.
Contract	Trade with most important suppliers is on the basis of contract.
Vertical integration	The hogs from our own farm(s) or the farm in which we invested occupy most of our purchase.
Quality management practices	
Management leadership	The quality strategy of our company is based on long-term planning. Our managers actively participate in quality improvement processes. Our mid-managers are trained in quality management practices frequently. Our employees are rewarded for quality improvement suggestions. We train our employees how to implement quality practices frequently. Our company has very good quality assurance systems (HACCP, ISO 9000 series or ISO14000). We can trace and track product from field to table. We make an effort in making quality goals and policies understood in the departments of our company.
Supplier quality management	Our most important suppliers are selected based more on quality than on price. We pay our most important suppliers a premium for good quality pigs. We provide our most important suppliers with feed and technology in order to get good quality hogs. We check the quality of the pigs (meat) delivered by our most important suppliers frequently.
Product/service design	We focus more on quality than on price in developing new products/ services. The employees of our company know the procedures and operation standards.
Process management	Our company has a well-developed cold chain (from production to distribution and selling). Our mid-level managers inspect the work floor on a regular basis to check all operational processes. We pay great attention to in-process inspection, review or checking in pork production.
Firm performance	
Sales growth	Total sales volume has grown faster than that of our main competitors in the last three years.
Market share	Market share has increased faster than that of our main competitors in the last three years.
Profitability	We have achieved higher profitability than our main competitor in the last three years.
Customer satisfaction	We achieved better customer satisfaction on product quality than our most important competitors in the last three years.

Promoting milk quality in smallholders' cooperatives: evidence from Ethiopia

Gian Nicola Francesconi

Abstract

In the emerging and globalising markets of Ethiopia and neighbouring countries, quality and price of milk are becoming more important than ever. The scope of this study is to identify effective measures to improve quality and safety of the milk produced by Ethiopian cooperative farmers, so that they can better compete in the marketplace. Econometric results, based on unique bio-economic data, suggest that cooperative experience and structure, and the choice of milk quality control system at the farm gate can indeed affect quality and safety of final dairy products.

1. Introduction

In the emerging and globalising urban markets of Ethiopia and neighbouring countries, food price and quality may soon become more important than ever. With the increasing integration of major agricultural areas into urban markets and the further incorporation of smallholders in value added supply chains (Reardon *et al.*, 2003), the role of cooperatives is subject to major changes. Given these new economic conditions, cooperatives can only remain in business when their performance improves not only in terms of production volumes and marketing activities, but also in terms of product quality and safety.

While the neoclassical approach (Helmerger and Hoos, 1995; Nourse, 1945) suggests that cooperatives can compete with investor-owned firms, other research building on agency and game theory suggests that traditional cooperative principles undermine optimal resources allocation and investment policies (Vitaliano, 1983), as well as the stability of members' coalition (Sexton 1986; Staatz, 1983). In other words, cooperatives are expected to face major problems related to membership desertion (Barham and Childress, 1992), heterogeneous membership occasioning free-riding behaviour (Putterman and DiGiorgio, 1985) and limited investments and capital mobilisation due to horizon problems. Cooperatives face in fact major challenges in terms of agency coordination, are notably deficient in providing adequate incentives to prevent free-riding behaviour (Fama, 1980), and in mobilising equity capital towards production systems upgrading and intensification (Cook, 1995; Jensen and Meckling, 1976). Because of their elaborate decision-making structure (farmers councils, farmers and management board), cooperatives are easy to get trapped in endless, political and internal oriented discussions, limiting the capacity and speed to respond to market

incentives (Henehan and Anderson, 1994). For these reasons, Karantininis and Zago (2001) expect cooperative to attract the more inefficient producers.

As observed in the Ethiopian dairy cooperatives, object of this specific study, the nutritional value and hygiene of milk at the farm gate may soon become a serious concern for cooperative farmers willing to keep competing in the marketplace (Francesconi and Ruben, 2007). The hygiene and nutritional value of milk at the farm gate determine consumer satisfaction as well as the profitability of cooperatives and all the different operators involved in the supply chain. Poor nutritional and hygienic attributes of milk at the farm gate (or production/farming quality) directly translate into reduced products' shelf life (i.e. increased supply waste), decreased production of butter and cheese, as well as increased consumer rejection.

Chaddad and Cook (2004) argue that typical financial and managerial constraints that cooperatives face in promoting product upgrading ask for substantial adjustments in their ownership and governance structure. In a similar vein, Sykuta and Cook (2001) identify new contractual arrangements that enable cooperatives to reduce search and monitoring costs regarding critical production attributes (i.e. quality and safety). Bogetoft and Olesen (2004) also indicate contracts as an important strategy for improving incentives for product upgrading and mutual insurance. This implies that major governance and investment problems that tend to constrain the upgrading of production systems should be overcome in such a way to align buyers interest with the interest of member-farmers. The transition from scale growth to quality upgrading depends on the right combination of internal and external incentives for improving product technologies and practices. High transaction costs and risk could, however, delay this transition. Even when ample public support for input delivery by the cooperatives is available, forward linkages to downstream agents are critical for improving care operations. In the case that these market incentives are in place (i.e. quality-pricing, grades and standards), internal reforms of cooperative governance and structure may be required to enable the adjustment of production systems. This might be related to new contractual regimes for co-investment with external shareholders and contracts with traders and retailers for timely delivery of high quality dairy products. In addition, public objectives for enhancing cooperative structures are mostly incited by efforts for improving input service delivery and output collection, usually within the framework of cheap food policies.

Such a collection of literature and empirical evidence motivate the research questions posed for this study. Is milk quality really a risk for the market competitiveness of Ethiopian cooperative farmers? And, if yes, how to minimise such a risk?

2. The sample

The sample available for this study provides a unique combination of biological and socio-economic measurements of dairy cooperative farming in Ethiopia. It includes

seven dairy cooperatives selected from a list provided by the FCC. Table 1 and Figure 1 show the spatial distribution and characteristics of the sample sites.

All sample sites are purposely selected from the Ethiopian Highlands, where dairy commercial production has a clear comparative advantage *vis-à-vis* other parts of the country (Lowlands), as well as the basic natural conditions to cope with international competitors (Ahmed *et al.*, 2003). The Highland regions occupy two-thirds of the country's territory, and are characterised by vast plateaus ranging from 1,400 up to more than 3,000 meters above sea level. The typical topography of the Ethiopian Highlands provides a suitable microclimate for the introduction of high-yielding dairy cows. Further, biophysical attributes, like the availability of vast grazing areas, mild slopes and fertile soil, adequate rainfalls patterns (1,000-1,900 mm/year) and temperature (0-30 °C) offer a relatively disease-free environment with high potential for animal feeding.

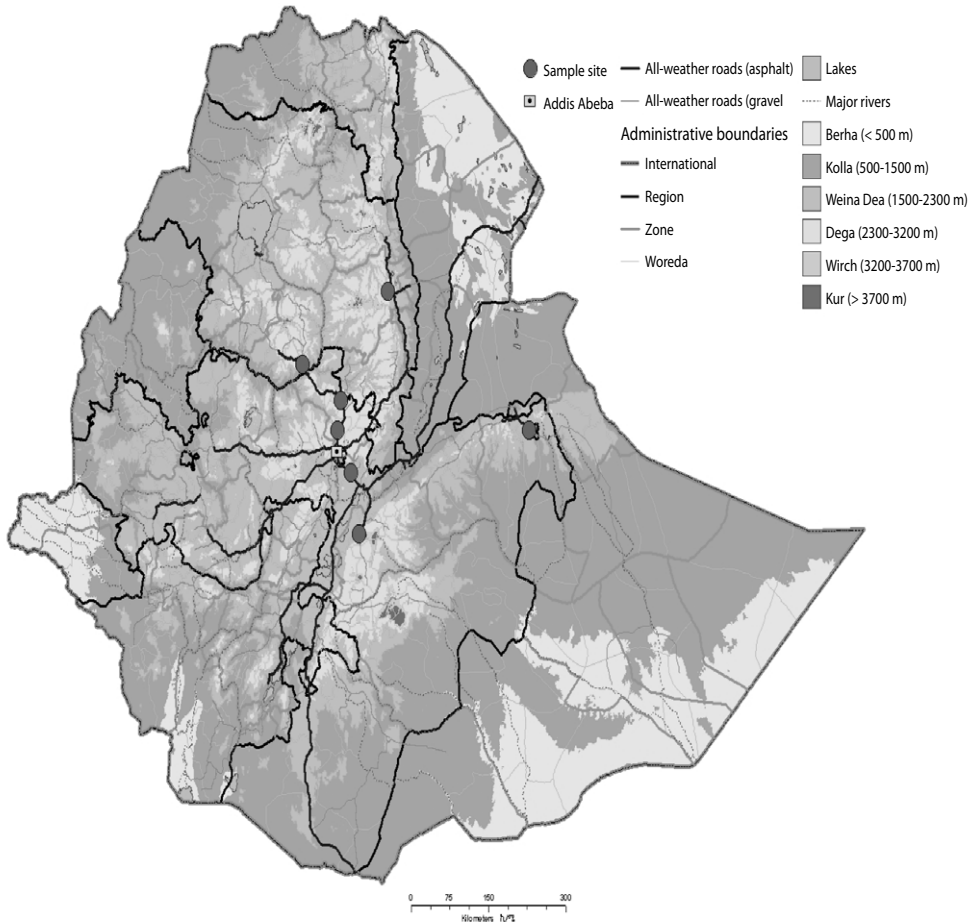


Figure 1. Dairy sample sites in Ethiopia, 2005.

Table 1. Dairy cooperatives sample, Ethiopia 2005.

Site (distance & direction from Addis Ababa)	Region and zone	Altitude (masl) ¹	Number of cooperatives	Number of farmers per cooperative	Farmers interviewed & milk samples taken
Dessie (400 km North-East)	Amhara (South Wollo)	2,700	1	18	15
Debre Zeit (50 km South)	Oromo (South Shewa)	1,600	1	760	60
Dejen (200 km North-West)	Amhara (East Gojam)	2,400	1	72	30
Selale (40 km North)	Oromo (North Shewa)	2,500	1	51	25
Selale (80 km North)	Oromo (North Shewa)	2,500	1	87	35
Asella (200 km South East)	Oromo (Arsi)	2,500	1	37	20
Harar (500 East)	Oromo-Somali (Harerge)	1,400	1	20	15

¹Metres above sea level.

The Highlands sample is diverse covering four regions and six zones. The number of farmers interviewed in each site was set in proportion to the overall number of members of each cooperative, organisation, association or group. Data was collected through direct interviews with collective managers (chairmen and members of the executive boards) as well as with member-farmers. Information from farmers was gathered at the milk collection centres (where cooperative farmers bring and bulk their milk on a daily basis), by interviewing each second farmer during collection activities. Further, two small samples were taken from the bulk milk of each farmer interviewed. All milk samples were delivered to the laboratory within 12 hours from collection, in order to analyse quality and safety attributes. Sample collection followed standard sampling procedures as defined by O'Connor (1995). Milk samples were gathered and analysed within a one-month period, so as to reduce the influence of random seasonal factors on milk attributes. Milk samples were analysed in order to estimate fat content (using the standard Gerber method), protein content (using the standard Protein Formaldehyde Titration method), and bacterial contamination (using the standard Plate Agar method followed by total bacteria count) as specified by O'Connor (1995).

3. Ethiopian dairy cooperatives

The market of Addis Ababa is by far the larger, wealthier and more diverse of the country. Major differences can thus be expected in terms of transaction costs between those cooperatives that sell in the market of Addis Ababa (the three cooperatives located within 100 km from the capital, Table 1) and those that do not. The average cooperative in our sample is 13 years old (established in 1993), and counts 54 member-farms located in a range of 10 km around the cooperative headquarters, which are usually situated in or close to urban areas. At the headquarters the milk supplies of member-farmers are collected on a daily basis, bulked, cooled in few cases (only the cooperatives supplying Addis Ababa have cooling tanks at the moment), usually processed into traditional fermented butter, cottage cheese, and sour milk or yoghurt, and then marketed. Currently no cooperative own machineries for milk sanitation (pasteurisation, UHT, filtration, etc.). At the same time, cooperative headquarters provide services (to procure feed, artificial insemination, veterinary care, training, credit, etc.) and market information back to their members. Before collection, most cooperatives screen the milk supplies using on-the-spot tests (71 percent of the cooperatives use the alcohol test, and 83 percent use the specific gravity test), which measure milk quality as good or bad, but not continuously²³. Milk supplies that do not comply with the quality standards imposed by these tests are rejected, even if the rejection rate appears to be negligible. At the moment, these tests are the only instruments available to regulate milk quality of members.

The lack of laboratory facilities for milk grading implies that the price received by cooperative members does not depend on milk quality attributes. In fact, milk price fluctuations in Ethiopia are mainly associated with location, seasonality, and the calendar of the orthodox Christian church. The latter involves at least four prolonged fasting periods, during which almost 40 percent of the national population abstain from consuming products of animal origin. Considering spatial and seasonal fluctuations, the average price received by cooperative members can be estimated at 1.8 birr per litre of milk (approximately 0.17 Euro) (Table 2).

The characteristics of cooperative farmers are given in Table 2. In our sample the majority of farmers are males with an average age of 46. On average they own two cows (78 percent of crossbred cows and 22 percent of zebu cows), and produce 12 litres of milk a day²⁴. This milk is characterised by high bacterial contamination and poor protein and fat content, compared to standards and secondary data from both developing and developed countries (Figures 2 and 3). The poor compliance with

²³ *The alcohol test* is a low cost, simple, and quick technique for a gross evaluation of milk colloidal suspension, overall hygiene and freshness (O'Connor 1995). *The specific gravity test* is a low cost, simple, and quick technique to detect undeclared water addition and cream removal from the milk supply, given milk temperature (O'Connor 1995).

²⁴ Ethiopian cooperative farmers have heterogeneous herds, composed by zebu cows and/or crossbred cows. The latter are hybrid genotypes, usually characterised by different proportions of Frisian and Zebu genes, and by higher milk productivity compared to pure indigenous zebu cattle.

Table 2. Dairy cooperative farming, Ethiopia 2007.

Variables	Mean (N=189)	Std. Dev.	Min.	Max.
Herd size	2.1 heads	1.2	1	7
Crossbred herd	78%	41%	0	1
Daily production	11.6 l	11.5	1	73
Herd productivity	6.1 l/day	4.2	0.25	23
Price received by farmers	1.8 birr/l	0.7	1.13	3.75
Farmer age	46	12.2	19	80
Female farmer	33%	0.47	0	1
Farm-Coop distance	2.6 Km	2.8	0.001	10
Total Bacteria count of milk	608 million cfu/ml ¹	2.34e ⁺⁰⁹	200	1.0e ⁺¹⁰
Fat content of milk	4.0%	0.9	2	9
Protein content of milk	3.0%	0.3	2	4.18

¹Colony forming units.

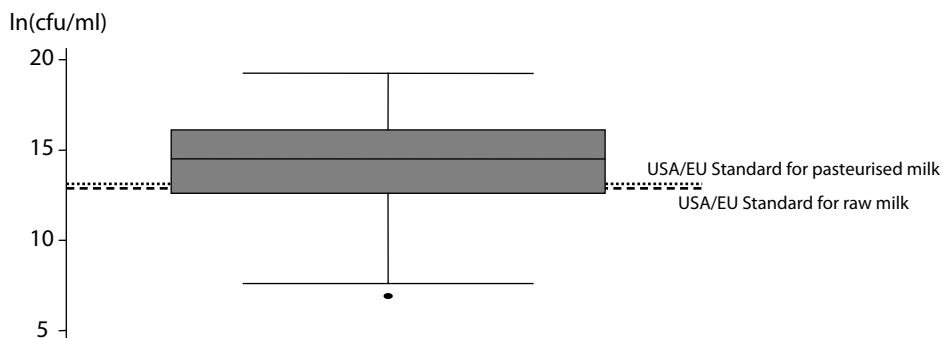


Figure 2. Total bacterial count in milk collected at the farm gate, Ethiopian cooperative farms, 2005. Total bacterial contamination (TBC) is measured by counting the number of bacterial colonies in 1 ml of milk (CFU/ml). The measurement units are here expressed in logarithms so as to reduce sample's variability. The standards included in the graph corresponds to the public standards adopted in USA and EU (EUFIC and FDA, 2006) for TBC in pasteurised milk (1,000,000 cfu/ml or 13.8 ln(cfu/ml)) and raw milk (2 million cfu/ml or 14.5 ln(cfu/ml)).

international standards and empirical evidence allow answering the first question set for this study. In emerging and globalising markets, the quality and safety attributes of the milk produced by cooperative farmers can indeed be a risk for their market competitiveness.

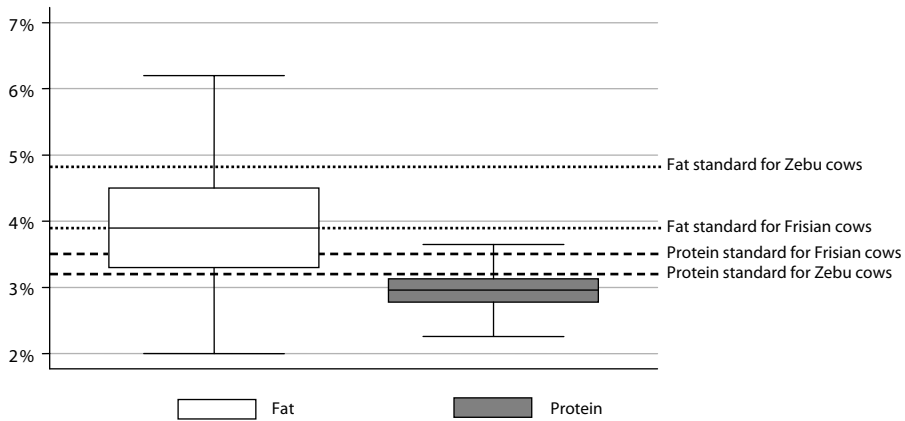


Figure 3. Fat and protein content in milk collected at the farm gate, Ethiopian cooperative farmers, 2005.

Fat and protein standards included in the graph are an average of secondary data from both developing and developed countries world-wide (Taneja and Aiumlamai, 1999; Walstra et al., 2006).

4. Empirical model

Given the ongoing changes in the business environment, cooperative farmers willing to keep competing in the marketplace may need to improve quality and safety at the farm gate, minimising the procurement costs. Neo-institutional economic theory (Hoff and Stiglitz 1993) recognises that collective action can indeed help farmers to access the market, reducing vertical coordination costs across farmers and buyers, but it also acknowledges that collective action entails inefficiency, due to horizontal coordination costs among member-farmers. Horizontal coordination costs are expected to be high in Ethiopian cooperatives, where marketing and managerial skills are at an infant stage. In most cases, in fact, Ethiopian cooperatives are strongly government-driven showing an over-centralised, corruption sensitive type of governance, directly inherited from the Derg (socialist) regime. Intuitively, given the volume of milk production and the marketplace, the higher are the costs to procure inputs, assets and information, and the lower is the net profit or the quality and safety of milk at the farm gate. Hence, inefficient farmers would be driven out of perfectly competitive markets because milk price and quality would be determined by efficient farmers, setting a level that would be exceeded by inefficient farmers.

This section presents a theoretical model to test the hypothesis that, given farm production, fp , and the characteristics of the marketplace, mc , collective governance, cg , can influence milk quality and safety at the farm gate, q :

$$q = f(cg | fp, mc) \tag{1}$$

Collective governance can be categorised further into formal and informal mechanisms. Formal mechanisms for milk quality at the farm gate are essentially quality standards, qs , price premiums, pp , and services for the provision of inputs, training, assets and market information, is . Extension services can help farmers to access market information, live animals, natural and artificial insemination, pastures, roughage and concentrate feed, veterinary care, training, credit, etc. However, extension services may not be fully exploited by the farmers if no quality standards are imposed, as per the carrot and stick theory. The adoption of minimum quality requirements can at least discourage farmers from bringing unhealthy or adulterated milk into the market²⁵. While the adoption of a price premium for milk quality can provide farmers with an incentive to improve the quality of their milk above the minimum acceptable standards, into a continuous upgrading process.

Given the formal mechanisms adopted for collective governance, milk quality at the farm gate can still vary according to farmers' characteristics, fc , like intrinsic motivation, capacity and opportunistic behaviour, which affect the importance of informal coordination mechanisms within the farmers' pool. Collective governance can thus be expressed as a function of:

$$cg=f(qs, pp, is, fc) \tag{2}$$

and milk quality and safety at the farm gate becomes:

$$q = f(qs, pp, is, fc | fp, mc) \tag{3}$$

Considering the data available, milk quality and safety at the farm gate, q , is measured by the level of total bacteria contamination (cfu/ml), tbc , fat and protein content (gr/ml), fat and $prot$:

$$q = f(tbc, fat, prot) \tag{4}$$

Milk quality standards, qs , are described by dummies for the usage of *alcohol*, and specific gravity, sg , tests:

$$qs = f(alcohol, sg) \tag{5}$$

Price premiums, pp , are not included in the empirical model (equation 10), since none of the cooperatives sampled make use of such incentive-mechanism. The equipment and facilities available to Ethiopian cooperatives do not allow milk quality grading (measuring milk quality by a continuous scale of values), preventing milk quality pricing and thus the adoption of price premiums. The extension services, is , provided by the cooperative to the farmers are expressed by the level of cooperative experience (age of the cooperative, in number of years since the establishment), *coopage*; the distance

²⁵ Milk can be easily adulterated through water addition or cream removal.

between farms and cooperative headquarters (km), *dist*; the number of members, *memb*, per cooperative, as well as its square, *memb*², as a linear relationship between milk quality and cooperative size is not expected:

$$is = f(\text{coopage}, \text{dist}, \text{memb}, \text{memb}^2) \quad (6)$$

Age and *gender* of the person responsible for dairy activities within the household are used as proxies for farmer's capacity and opportunistic behaviour, *fc*. *Age* is taken as a proxy for the experience, intrinsic motivation and cultural background of the farmer; and *gender* is a proxy for the time allocated by the farmer to dairy activities (women usually allocate less time to dairy activities since more involved in household keeping tasks), as well as for gender specific sensitivity:

$$fc = f(\text{age}, \text{gender}) \quad (7)$$

Farm production, *fp*, is captured by the herd size (number of cows), *herd*, and a dummy describing herd's phenotype (crossbred cows or indigenous zebu cattle), *breed*, which can be considered as a good proxy for cow productivity:

$$fp = f(\text{herd}, \text{breed}) \quad (8)$$

The characteristics of the cooperatives' marketplace, *mc*, are captured by a dummy, *AA*, distinguishing between those cooperatives that do have access to the urban market of Addis Ababa (the biggest market in Ethiopia), and those who do not:

$$mc = f(AA) \quad (9)$$

Therefore, structural Equation (3) assumes the following reduced, empirical form, where the quality and safety attributes of the milk produced by the cooperative farmer, *i*, is expressed as function of:

$$\ln tbc_i, \ln fat_i, \ln prot_i = \alpha_0 + \alpha_1 alcohol_i + \alpha_2 sg_i + \alpha_3 \ln coopage_i + \alpha_4 \ln dist_i + \alpha_5 \ln memb_i + \alpha_6 \ln memb_i^2 + \alpha_7 gender_i + \alpha_8 \ln age_i + \alpha_9 \ln herd_i + \alpha_{10} breed_i + \alpha_{11} AA_i \quad (10)$$

Where Equation (10) is estimated by three separate regressions, with *tbc*, *fat* and *prot* as dependent variables. Since fat and protein content are simultaneously determined within the mammary cells, and statistically correlated (55 percent correlation), disturbances across regressions with *fat* and *prot* as dependent variables are expected to be simultaneously determined, justifying an estimation based on seemingly unrelated estimators (SURE). While, the *tbc* regression is estimated using a simple OLS estimator.

The empirical model presented (Equation 10) could suffer from econometric problems inherent to the use of cross-section data, and these should be addressed

before interpreting the results. The most important potential problem is related to the direction of causality across independent and dependent variables. Often, when econometric models are built on data collected at one point in time, it is difficult to ascertain that right hand side variables cause variations of the left hand side variable, rather than the other way around (endogeneity). However, as mentioned above, markets as well as public regulation currently do not provide Ethiopian dairy cooperatives with clear incentives for milk quality management. Considering also that milk quality at the farm gate is not fully observable for cooperative farmers, due to lack of appropriate equipment and facilities to grade it, it seems difficult to argue that milk quality influences the choice of collective governance, farm production, or the marketplace. Additional concerns are possible biases due to omitted variables, heteroskedasticity or not normally distributed residuals. Even if Equation (10) is clearly a reduced form of the structural model (Equation 3), no obvious misspecifications (omitted variables), which can simultaneously affect dependent and independent variables, can be observed. Finally, skewness and kurtosis tests indicate that residuals from Equation (10) are normally distributed at five percent significance level, while heteroskedasticity was solved by estimating the Equation (10) in logarithmic form.

5. Results

Results from the estimation of Equation (10) are given in Table 3. Findings suggest that, given farm production, and the characteristics of the marketplace, milk quality at the farm gate is highest when dairy cooperatives have more experience, and count 60-70 older members, located further than 2.6 km from the cooperative headquarters.

Results show that an additional year of cooperative experience decreases bacterial contamination of milk by 372 cfu/ml. Cooperative experience is in fact crucial in the Ethiopian context, where dairy cooperatives are usually formed by smallholder farmers with very limited or no experience of collective management and marketing strategies. As suggested by the FCC and Tegegne (2003), hiring in professional managers might be a valuable option to speed-up the capacity building process.

The optimal cooperative size is computed dividing the coefficient for the number of members by the coefficient for the squared number of members (in absolute value). The output is multiplied by 0.5 and then re-converted from logarithmic into the original numeric form. The existence of an optimal size can be explained by noting that smaller cooperatives (with less than 60 members) are likely to have less bargaining power and visibility *vis-à-vis* public services, NGOs and the market. Larger cooperatives (with more than 70 members) may instead be constrained by difficulties in holding management accountable to the members (i.e. shirking behaviour), leading to inappropriate political activities, or financial irregularities (as showed by Hoff and Stiglitz 1993). In both cases farming inputs and market information available to the members diminishes, as does protein and fat content of milk. As observed in the cooperatives of *Selale* and *Debre Zeit*, and suggested by Tegegne (2003),

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Table 3. Estimation results (Number of observations = 185).

Explanatory variables	Dependent variables ^a		
	Fat content	Protein content	Total bacteria count
Quality standards:			
Specific gravity test (<i>sg</i>)	-0.98 (0.34)**	-0.42 (0.15)**	1.07 (3.56)
Alcohol test (<i>alcohol</i>)	-0.16 (0.11)	-0.07 (0.05)	-0.88 (1.40)
Input services:			
Farm-Coop distance (<i>Indist</i>)	0.04 (0.03)	0.03 (0.01)**	0.64 (0.41)
Coop-size (<i>Inmemb</i>)	7.18 (2.18)**	2.11 (1.00)**	18.4 (25.4)
Coop size square (<i>Inmemb²</i>)	-0.88 (0.27)**	-0.25 (0.12)**	-2.35 (2.11)
Coop-experience (<i>Incoopage</i>)	-0.10 (0.23)	0.05 (0.11)	-5.92 (2.57)**
Farmer characteristics:			
Farmer age (<i>Inage</i>)	0.04 (0.06)	0.01 (0.03)	1.14 (0.64)*
Female farmer (<i>gender</i>)	-0.02 (0.03)	0.01 (0.02)	-0.06 (0.38)
Farm production:			
Herd size (<i>Inherd</i>)	-0.01 (0.03)	0.00 (0.01)	-0.45 (0.34)
Cross bred herd (<i>breed</i>)	-0.08 (0.05)*	0.01 (0.02)	0.34 (0.55)
Marketplace:			
Access to Addis Ababa market (<i>AA</i>)	-0.09 (0.05)*	0.03 (0.02)	-3.14 (0.59)**
R-squared	0.3288	0.2402	0.2563

^aStandard error in parentheses; *denotes significance at 10% level; ** denotes significance at 5% level.

options to optimise dairy cooperatives' size, may involve joint ventures between small cooperatives (union of two or more cooperatives), or the partitioning of big ones through the establishment of additional centres for milk collection, as well as information and inputs distribution.

When the distance between farms and cooperative headquarters increases by one km, milk protein content increases by one percent. The large majority of cooperative headquarters is located in or close to urban centres, where land is scarce by definition. Farms located close to the coop-headquarters are characterised by limited space for the herd, and difficult access to rural pastures, reducing the bio-diversity of feed intake and the welfare of the cows. Consequently, dairy cooperatives need to find effective measures to engage rural, rather than urban farmers. Options may include the establishment of satellite cooperative centres in peri-urban areas, whilst ensuring that urban consumers can still be reached.

Empirical evidence suggests also that tests measuring milk quality as good or bad, and not continuously, like the alcohol and specific gravity test, are either highly counter-

productive or ineffective. While the alcohol test has no significant impact on quality attributes of milk, the usage of specific gravity test decreases milk fat content by 2.7 percent, and milk protein content by 1.5 percent. The specific gravity test in particular is often misused²⁶. But more often both tests impose quality standards that lie below the actual quality of milk, preventing cooperative farmers from further improving the quality of their supplies. As suggested by Weaver and Kim (2001), these quality tests need to be replaced with grading techniques that would allow a more precise observation of milk quality, based on a continuous scale of values, creating also the opportunity to price and trace milk quality.

Table 3 indicates that farmer's characteristics are not really relevant in explaining milk quality and safety at the farm gate. An additional year of age affects only milk bacterial contamination, decreasing it by just three cfu/ml, while gender does not affect any milk quality attributes.

Among the control variables used for estimation only herd size appears irrelevant in explaining milk quality at the farm gate. On the other hand, when herds include cows with crossbred phenotypes milk fat content decreases by one percent. Compared to indigenous zebu cattle, crossbred cows are known for producing larger volumes of milk characterised by lower nutrient density. Finally, for those cooperatives that have access to the market of Addis Ababa, milk fat content decreases by 1.1 percent, and milk bacterial contamination decreases by 23 cfu/ml, conditions that may reflect the differences between urban and rural consumers' preferences.

7. Conclusions and implications

Empirical evidence and (inter)national policy orientation point to collective action as a potential catalyst to link Ethiopian small dairy farmers to the market. However, in Ethiopia and neighbouring countries the market environment is undergoing rapid and radical changes. In these emerging and globalising markets, quality and price of milk are becoming more important than ever for business success. The scope of this study is to identify efficient measures to improve quality and safety of the milk produced by Ethiopian cooperative farmers, so that they can better compete in the marketplace. Econometric results, based on unique bio-economic data, suggest that cooperative experience and structure, and techniques for quality grading can indeed affect milk quality at the farm gate, as well as the costs of quality procurement.

Still, the fragility of consumer's willingness to pay for milk quality and safety may discourage cooperative members as well as private partners from accomplishing the tasks recommended by this study, justifying the intervention of public institutions

²⁶ The specific gravity test, in particular, is usually applied without measuring milk temperature. Since milk density varies according to milk temperature, the results of the specific gravity are unreliable.

under a public-private partnership²⁷. In particular, governmental and non-governmental organisations are recommended to support dairy cooperatives in hiring professional managers; promote and facilitate joint ventures (unions) among small dairy cooperatives (less than 60 members), as well as the partitioning of big cooperatives (more than 70 members) into satellite cooperative centres for milk collection and bulking, as well as inputs and information distribution; invest in peri-urban public infrastructures (roads, telecommunication, electricity and water supply), so as to promote and facilitate the establishment of satellite cooperative centres in the rural areas surrounding cities and towns; invest in public and/or subsidise the establishment of private laboratory facilities for milk quality grading based on standardised chemical and microbiological techniques.

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**Quality upgrading,
bargaining
and
value distribution**

Comparing individual and collective group contracts in the fresh pepper market in Costa Rica: a simulation approach

Fernando Sáenz-Segura, Marijke D'Haese, Robert Schipper and Ruerd Ruben

Abstract

The small-scale pepper producers in the El Roble settlement Costa Rica face a monopsonistic market. Only one processing firm buys the fresh pepper bunches, which has all bargaining power in the price decisions with respect to the farmers and the quality selection criteria. The high rejection rates triggered the farmers to organise a collective marketing system and to trade pepper in a group contract. We use a non-linear integer simulation model to analyse the contractual form (individual or group contracts) which maximises the income of the firm and farmers in three scenarios, namely, monopsony (firm holds all bargaining power), monopoly (producers hold all bargaining power in a group contract), and joint profit maximisation (firm and producers have some bargaining power in the group contract). This paper attempts to model the market conditions under which collective action amongst farmers are profitable for both the farmers and the firm even when the farmers' bargaining power increases at the disadvantage of the firm.

1. Introduction

Many rural poor farmers in developing countries face high transaction costs for trading their produce. The impact of transaction costs on smallholders in developing countries is even more important under restrictive market environments, where unequal bargaining power or monopsony conditions prevail. Several studies discussed how new hybrid organisations, like contract farming, emerge in response to transaction costs (Bardhan, 1980; Ellis, 1988; Hayami and Otsuka, 1993; Key and Runsten, 1999) and could lead to different levels of supply chain integration (Hobbs, 1996). Under certain conditions, small farmers and agro-processing firms could agree on a contractual arrangement that may be preferred to spot markets or full vertical integration. Collective action in contracting has not only been considered as a pathway for achieving a better bargaining position, but also contributes to creating market access. This paper models the dynamics of contracts in the pepper supply chain of Costa Rica. There are no spot markets for pepper and since 2001 only one processor buys fresh pepper from producers under pre-defined quality conditions. In the El Roble settlement (northern part of Costa Rica) a small group of the most experienced farmers started a producer organisation with the aim of jointly monitoring the collection and transport of fresh pepper to the processing firm, and trading the pepper under a group contract. The aim of the group contract was to improve the

quality of fresh pepper offered to the processing firm, which would reduce rejection rates, and increase the farmers’ bargaining power *vis-à-vis* the monopsonistic firm.

Neo-classical economic theory predicts that a monopsonistic buyer firm would resist the establishment of a producer association for it limits its influence on exchange conditions (Wilson, 1986; Key and Runsten, 1999). However, when transaction costs are taken into account, group contracts could be interesting for the monopsonistic firm as well because individual contracts are expensive to implement. Williamson (1991) explained how trading agents search for the best mode of governance that fits the characteristics of the transaction in order to minimise transaction costs. The level of these transaction costs is determined by uncertainty (increasing) and frequency (decreasing) of the transactions and the amount of specific investments involved (increasing) (Williamson in Ménard, 2005).

The aim of this study is to model the contract relationships between pepper producers and the processing firm, and to assess the conditions under which a group contract is preferred over individual contracts; or in other words, our objective is to model under which conditions the firm is disposed to give up its monopsonistic power status and create a win-win governance structure with the farmers. We thereby try to assess the trade-offs between governance costs and benefits of different contractual forms that could optimise farmers’ income and processor’s profit under changing market conditions, i.e. price of fresh pepper, distribution of bargaining power, coordination costs incurred by farmers and the firm and the risk profile of farmers. We hypothesise that a processing firm will choose for a group contract if the loss in bargaining power is compensated by reduced governance costs because of dealing with one contract instead of multiple contracts. We also theorise that farmers will accept a group contract if the costs of organising collective action are less than the potential income increase that results from a reduction of refused pepper and/or the received price premium. The parameters of the non-linear integer simulation model used for the analysis were calculated from survey data of the El Roble farmers’ organisation.

The remainder of the paper is as follows. The next section gives a short overview of the structure of the local pepper market in Costa Rica. Section three presents the methodology used, with the results of the modelling exercise in section four. Finally we conclude in section five.

2. Pepper market in El Roble

2.1. Evolution of the pepper market

The pepper market in Costa Rica has traditionally been highly segmented, with several processors operating at different levels of production and varying degrees of professional organisation. Processors are spatially oriented towards specific procurement zones and they offer several contractual conditions to pepper producers.

Pepper production is very decentralised and operated by smallholders. The oldest production area is El Roble settlement, where producers have grown pepper since the mid 1980s. Before the year 2000, pepper producers were dealing mostly with the largest processing firm in Costa Rica. This company is specialised in the production of white pepper, which requires a more expensive process and the highest quality of fresh pepper. Most of the white pepper is sold by this Costa Rican processor under a contractual arrangement to a North American food processor based in Costa Rica. The reselling price for the Costa Rican processor is usually higher than the international prices, due to a special contractual arrangement between these two processors, where quality and timing are two key factors. The North American company recognises the high quality of the white pepper provided by the Costa Rican processor as well as the timely deliveries.

The Costa Rican processor moved into contractual arrangements with smallholders to obtain raw pepper for the following three reasons. Firstly, the investments in the processing plant are considerable so that the company has to secure a sustainable flow of inputs. Secondly, since the number of farmers producing pepper is limited to less than 80 producers, a spot market for pepper hardly exists in Costa Rica. Thirdly, full integration to procure raw pepper from own plantations would not be an option as it is too expensive to operate integrated pepper plantations. Pepper production is very labour intensive in crop management and continuous harvest.

Faced with a thin pepper market, the processor took initiatives towards introducing 'agribusiness normalisation' in the pepper sector. Actions taken by the processor included offering the producers a written contract which guaranteed a minimum price in US Dollars. The company provided technical assistance as well as the possibility to acquire and pay pepper seedlings under a convenient loan. Transport costs from the settlement to the processing plant were entirely covered. Farmers were usually paid one week after each delivery and quality requirements were specified in the contract. Hence, the processor transferred asset-specificity to the farmers and tied them up into the production and sales of pepper. Farmers became more specialised growers and were tied to the processor through the contracts. Although such support policies are usually limited in time (Glover, 1987; Singh, 2002), the processor exerted its monopsony position to change the contract rules once it had assured its provision of pepper by raising quality standards and lowering procurement prices. The 'agribusiness normalisation' of the processor thus resulted in more disadvantageous contractual conditions for the farmers; off course to their increasing discontent (Glover, 1987; Singh, 2002).

In 2000, a local entrepreneur integrated production and processing of pepper in El Roble by setting up a processing plant *B* and thereby challenging the monopsonistic power of the other processor. The new processor *B* bought at farm gate, and paid cash at the moment of the purchase and provided farmers an extra 5% on top of previous purchase price. The pepper was bought in bulk with no restrictions on the applied production technology and delivery quality. Farmers preferred selling

to the new processor and breached their earlier contracts. Producers thus exerted their bargaining power and waited for the two buyers every week to negotiate on a convenient purchase price²⁸.

One year later, processor *B* stopped its activities in the pepper market, which put the initial processor again in a monopsonic power position. Early in 2001, the processor changed all contract rules regarding payment, technical assistance, transport conditions, and collection place. The purchase price dropped significantly and the quality requirements became stricter. This was causing large discontent amongst the producers. In response, producers started to consider the establishment of a farmers' organisation (Glover, 1987) in order to increase their bargaining power (Key and Runsten, 1999). The processor redefined its organisation strategy and looked for other contractual forms that would allow lower enforcement costs and higher stability in long-term deliveries. Hence, the firm also showed interest to promote collective action from its suppliers, rather than to continue with individual agreements.

By 2001 the processor was operating with 7 people and temporally hired at least 3 more people for services such as the transport of raw materials. The processing facility covered approximately 12,000 m². Operation costs amounted to about \$3,000 per month (these are general operational costs and do not include the purchase of fresh pepper). Grading and packaging the fresh pepper were the most expensive operations.

2.2. APROPISA S.A. farmers' association

In reaction to the abrupt change in market conditions, a small group of the most experienced farmers from El Roble started a group called APROPISA S.A., which operated as a producer association with 19 members at the time of research (2001-2002). This producer organisation basically records individual pepper deliveries from each member and distributes the payments received from the processor accordingly²⁹. As a membership fee, APROPISA S.A. charges 10 Colones/kg delivered. APROPISA S.A.'s aim is to become a trading partner for the processor while improving the conditions at the collection point by increasing the quality monitoring of the deliveries and improving transport conditions.

For the producers, the availability and skills of pepper pickers as well as the packing and transportation are the most important determinants of quality. Pepper is harvested the day before the collection date (but some farmers may start earlier due to shortages of hired labour). Like any other fresh product, bunches of fresh pepper should be processed as quickly as possible before quality degrades. Only mature bunches should be delivered. Inexperienced pickers and opportunistic farmers may increase

²⁸ A surprising fact is that most producers were partially or totally breaching the contract with the processing company just because *Company B* paid ten Colones more per kilo of fresh pepper.

²⁹ The pepper from each member is weighted and recorded manually on individual cards before being delivered to the processing company.

the proportion of immature bunches and thus increase the rejection rate. Hence, supervision before delivery would be required to prevent the mixture of both mature and immature bunches. Transportation conditions from the plot to the collection point and from there to the processing plant also affect the quality of the bunches. Once the delivered pepper is weighed and recorded for each farmer at the collection point, the pepper is packed in bags. The content of the bags often suffers from being piled up on the truck. The quality of the pepper is affected most in the first bags that support the weight from the others on top. The truck has an open-air freight compartment with no cover. After leaving El Roble the truck driver stops at another settlement to collect more pepper before continuing the three-hour journey to the processing facility. During that time the bags are exposed to rain or sun.

The quality of fresh pepper is very important for the processor since 90 percent of the production is white pepper for industrial use where top quality grains are required. The industrial yield of processed white pepper is lower than that for black pepper (4.2 kg fresh pepper is required for 1 kg of white pepper compared to 3 kg for 1 kg of black pepper).

In summary, product rejection due to quality default is mainly caused by two factors: (1) deficient transport conditions and (2) immature pepper included in the deliveries. Rejection rates are on average 11 percent of each delivery. This is a very sensitive issue for low-income farmers and it is one of the most common sources of distrust with the processor which tends to discourage the continuation of the relationship. Since most farmers act individually at the moment of the delivery, these two factors cause rejection rates that are partially out of their control. Therefore the farmers' group aims at reducing the rejection rates by controlling the quality of the pepper provided at the collection point, organising and improving transport conditions themselves, and improving their contractual arrangements with the processor.

2.3. Contractual arrangements between farmers and processor

As mentioned above, the processor firm is faced with a thin market, and encourages new farmers to enter the pepper market. The relation with the farmers was initially based on verbal agreements, but for the last three years the company has also offered written contracts. Written contracts offer a guaranteed minimum price that is corrected for inflation (minimum price in US\$), hence, it reduces the farmer's risk. However, this facility is only provided when the farmers are willing to commit themselves to the buyer for a period of 15 years and to deliver pepper to the processing plant. The farmers are charged 10 Colones/kg of accepted pepper for technical assistance. Other contract conditions are fixed in a verbal agreement and include the frequency of pepper collection (usually every two weeks), the terms of payment (at the time of next collection), the transport costs (10 Colones/kg delivered) and the quality requirements. Furthermore, delivery prices are agreed upon. However, the processor can change these prices anytime. The agreements have no specific ending date. A pepper plant has to grow two years before the first harvest and can produce continuously for 15

years when given appropriate care and maintenance. The firm needs and wants to keep all producers who invest in this pepper life cycle as its supplier, and thus encourages producers to keep replacing older pepper plants.

The cost of implementing an organisation (for the farmers) and that of dealing with an organisation (for the firm) *vis-à-vis* the gains obtained by each party are the main analytical issue addressed in this study. One or both actors may switch between individual and group contracts when market conditions change, when the costs of organising and coordinating collective actions become higher than the benefits, when uncertainty increases due to adjustments in the amount and frequency of deliveries and when the balance of market power between agents shifts. The next section introduces a simulation model that is used to reflect the effects of aforementioned issues.

3. Methodology

3.1. Modelling framework for analysing contractual choice

We designed a non-linear integer simulation model to assess the contractual arrangements that could maximise the processor's and farmers' gross income. The model has been inspired by the approach proposed in Dorward (2001). The sum of the gross income—defined as value of sales minus the value of variable and fixed costs, not including the value of own labour, capital and land—of the farmers and processor is maximised, taking into account their relative market power and risk preferences.

In the model, individual farmers (*sellers*) deliver pepper to one single monopsonic processor (*buyer*). Mature pepper plants are harvested throughout the year, yet with a clear harvesting peak resulting in two marketing seasons (*s*): low-supply (March to November) and high supply (December to February). The contractual forms (*k*) are either individual contracts (IC) or group contracts (GC). The processor and farmers may exhibit low or high opportunistic behaviour (*j*) with defined probabilities of occurrence and associated expected loss. Opportunistic behaviour from the farmers' side may occur when they intentionally mix immature with mature pepper bunches, while opportunistic behaviour from the processor's side may arise when rejection rates become stricter without any reason. Probabilities for a given party behaving opportunistic against the other party are assumed to be higher in the case of individual contracts compared to a group contract. It is expected that rejection rates and supervision costs are highest under high opportunistic behaviour of farmer and processor. We also assume that the firm's production costs are lower under group contracts, since fresh pepper is of better quality, with the lowest costs when opportunistic behaviour is low.

The model calculates the income levels of the farmers and the firm with the quantity transacted as endogenous variable. Furthermore, risk aversion for both parties is modelled by following a Target MOTAD approach (Tauer, 1983), where income

deviations below a target income for each party should be smaller than defined parameters *lambdas*. Low levels of both *lambdas* indicate that the buyer or seller is risk-averse regarding such income deviations.

It is useful to consider two extreme cases where the trade of pepper will be the result of negotiations between the buyer (processing firm) and the seller (groups of farmers), namely (1) a monopoly where the farmers' group would have all market power and (2) a monopsony (buyer has all the market power). For the in-between cases joint profit maximisation prevails. When both groups have equal bargaining power, a bilateral monopoly situation emerges (Henderson and Quandt, 1980). When individual contracts are set up, monopsonistic market conditions prevail as the firm (buyer) has full market power, i.e. the buying price for fresh pepper is set according to the value of its marginal product (Henderson and Quandt, 1980). In the case of collective action, a bilateral monopoly emerges, i.e. one buyer and one group of sellers.

The income of both farmers and firm should be at least equal to a reservation income. When a monopsony prevails the farmers as group should at least receive a margin (income) that is attractive enough to stay in the pepper cultivating business. Conversely, when a monopoly of farmers prevails, the buyer should at least have a profit (margin between value of sales and production and transaction costs) that is attractive enough to stay in the pepper processing business. For both a minimum income constraint is defined in the model. In the case of joint profit maximisation, both income constraints are considered.

Figure 1 presents a schematic overview of the difference between individual contracts and a group contract. As mentioned above, the model is aimed to simulate which governance structure leads to a maximum processor's and farmers' gross income, with the minimum quality default in delivering fresh pepper.

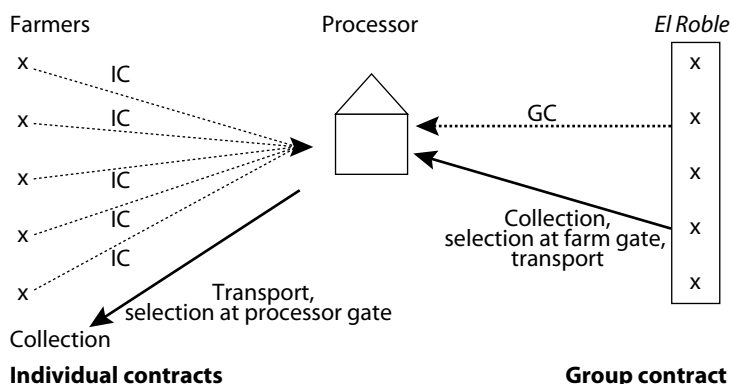


Figure 1. Individual versus group contracts with the processor.

3.2. Data

The El Roble settlement was chosen because it is the oldest pepper producing area and the main production zone in Costa Rica. The most skilled pepper producers are found in this settlement and it is the only area with a producers' organisation. Detailed data on pepper production and marketing was gathered through farmers' surveys in 2000 and 2001, while data from the processor was registered during in-dept interviews. This primary information reflects the production and market situation, between the processor and the group of producers from El Roble settlement. From these interviews, we defined most of the parameters and assumptions for the model. No recent secondary data was available on the production and marketing of pepper in Costa Rica.

The exchange rate used was one US\$ for 300 Colones. Table 1 gives an overview of some major characteristics of the 19 producers who started the APROPRISA-group. The high variability between the farmers needs to be acknowledged. However, the model considers the sum of the data from all 19 farmers to define the parameters in the model. This reflects the situation in the field. One could however assume that the size of the pepper production of individual farmers influences the production costs, transaction costs and farmer's behaviour in contracting.

The degree of specialisation in pepper farming is limited. The low degree of specialisation in pepper production is shown by the small area with pepper and the limited share of pepper in the total household income. It is a highly labour intensive crop which makes it an interesting diversification activity for smallholders; also because it does not require complex technologies or machinery. It requires detailed attention and frequent disease control through the cropping cycle, and can reach high, fairly stable yields per hectare. This gives family farms a competitive advantage compared to large commercial plantations.

Table 1. Descriptive of the pepper production by farmers in the Apropisa group (n=19).

		Mean per farmer (std. deviation)	Sum
Total land	ha	36.95 (50.89)	702.14
Area with pepper production	ha	0.92 (0.61)	16.59
Total income	\$	7,528.98 (4,903.62)	143,050.57
Income from pepper	\$	2,744.95 (2,159.69)	4,6664.10
Share of pepper in total income	%	36.93 (25.17)	
Production of pepper	kg	3,734.84 (3,172.31)	70,962.00
Rejection rate	%	11.94 (2.42)	
Price of pepper	\$/kg	0.96 (0.03)	

3.3. Model specification

We consider two market conditions (s): low and high supply seasons; two contract arrangements (k): individual and group contracts (IC and GC, respectively); and parties may display a low or high level of opportunistic behaviour (j) (low-opp and high-opp, respectively). The model specification is as follows:

Objective function:

$$Max A = \sum_{kjs} w_{kj} B_{kjs} pb_{kjs} + \sum_{kjs} (1 - w_{kj}) S_{kjs} ps_{kjs} \quad (1)$$

Gross Income calculation:

$$B_{kjs} = X_{kjs} \left((1 - refuse_{kjs}) / indy \right) frp - X_{kjs} (1 - refuse_{kjs}) (F^*_{kjs} + premium_k + fpc_{ks} / indy + ft_{ks} + fg_{ks}) - ff_{ks}, \quad \forall k, j \quad (2)$$

$$S_{kjs} = X_{kjs} (1 - refuse_{kjs}) (F^*_{kjs} + premium_k) - X_{kjs} (ppc_{ks} + pg_{kjs} + pt_{kjs} + pts_{kjs} + pmf_k) - pf_{ks}, \quad \forall k, j \quad (3)$$

Minimum expected gross income requirements per season:

$$\sum_{kj} B_{kjs} pb_{kjs} \geq rb_s, \quad \forall s \quad (4)$$

$$\sum_{kj} S_{kjs} ps_{kjs} \geq rs_s, \quad \forall s \quad (5)$$

Target MOTAD part:

$$\sum_s (B_{kjs} + Zb^-_{kjs}) \geq b^*, \quad \forall k, j \quad (6)$$

$$\sum_s (S_{kjs} + Zs^-_{kjs}) \geq s^*, \quad \forall k, j \quad (7)$$

$$\sum_{kjs} pb_{kjs} Zb^-_{kjs} = \lambda_{buyer} \quad (8)$$

$$\sum_{kjs} ps_{kjs} Zs^-_{kjs} = \lambda_{seller} \quad (9)$$

Capacity restriction:

$$\sum_{kj} X_{kjs} \leq cap^* qs_s, \quad \forall s \quad (10)$$

Binary part of the model:

$$X_{kjs} \geq m^* Y_{kjs}, \quad \forall k, j, s \quad (11)$$

$$\sum_{kj} Y_{kjs} \leq 1, \quad \forall s \quad (12)$$

In the objective Equation (1), the sum of the gross income of processor and farmers is maximised. This is expressed as the expected income of processor (B) and farmers (S) multiplied by their bargaining power. The w is defined as a measure of bargaining power of the processor with respect to the farmers with a value ranging from 0 to 1 ($0 \leq w \leq 1$). If $w = 0$ farmers take all the gains and if $w = 1$ the processor obtains all benefits, subject to minimum income requirements and risk considerations of the other party. We consider for the individual contracts that $w = 1$ in all cases. In the case of group contracts we distinguish market conditions between a monopoly ($w=0$) and a monopsony ($w=1$). The parameters pb_{kjs} and ps_{kjs} measure the probability for a given party (processor or farmers) of other party's opportunistic behaviour (j), under a certain contractual arrangement (k) and market condition (s). Probabilities sum one for each market condition (s). The probability for farmers behaving opportunistically is higher when the processor chooses individual contracts and lower when group contracts are chosen. The probability for the processor behaving opportunistically is higher when farmers choose individual contracts and lower when they choose group contracts.

Equations (2) and (3) show the endogenously determined income of the processor and farmers, respectively, under contractual arrangement (k), opportunistic behaviour (j) and season (s), by taking into account that:

- X_{kjs} : the endogenously determined volume of fresh pepper traded;
- *refuse*: rejection rate which is defined at four different levels: 9% (IC and low-opp), 15% (IC and high-opp), 1% (GC and low-opp), and 5% (GC and high-opp);
- *indy*: the industrial yield, defined by the processor as 4.20 kg of fresh pepper to produce 1 kg of processed white pepper;
- frp_{ks} : processor's price for white pepper, equal to \$8/kg. This is the highest selling price reported by the processor in 2000. Selling prices may vary every semester, according to negotiations with the processor's main client (the aforementioned North American food processor based in Costa Rica). This niche market arrangement is relatively isolated from the world pepper market;
- $F^*_{k,j,s}$: purchase price of fresh pepper for the processor and the farmers; *premium_k* is a quality premium paid as an incentive for good quality pepper in the group contract;
- fpc_{kjs} and ppc_{ks} : the production costs for the processor and the farmers, respectively. The processor reported different production costs per kg of white pepper under k and j . The farmers survey estimated the average production costs at \$0.17/kg of fresh pepper;

Individual and collective group contracts in the fresh pepper market in Costa Rica

- fg_{ks} , ft_{ks} , pg_{kjs} , pt_{kjs} , pts_{kjs} and pmf_k : organisation costs when individual and group contracts are chosen; fg_{ks} and ft_{ks} are the coordination and transport costs for the processor per kg of fresh pepper under k and s ; pg_{kjs} is the cost for farmers to organise supervision at the collection point, estimated at \$0.107/kg of fresh pepper for the supervision by 3 people during 3 hours at each delivery in low supply season; and \$0.025/kg for supervision by 3 people during 6 hours at each delivery in high supply season; pt_{kjs} is the cost of transportation from El Roble to the processor's processing facility and is estimated at \$0.0204/kg of fresh pepper in a 2.5 ton truck; pts_{kjs} are the costs of supervising the transportation, estimated at \$0.024/kg of fresh, given a processor's low opportunistic behaviour; and \$0.0032/kg under processor's high opportunistic behaviour^{30,31}. pmf_k introduces a membership fee when group contracts are chosen;
- ff_{ks} and pf_{ks} : fixed costs for processor and farmers when they trade pepper respectively. For the farmers, this is the minimal cost of delivering and referring to the value of working time and the time needed for delivery at the collection point. For the processor, we consider half of the monthly administrative costs for the management for processing pepper.

Equations (4) and (5) express that the expected gross income of processor and farmers should be larger than a reservation income which is equal to what they could have earned in an alternative activity in both seasons of the year. For the processor (rb) this is defined as half of the target income, namely \$19,400, equally divided over each season. For the farmers (rs) it is defined as the average income obtained from other agricultural activities (commercial crops, livestock production and off-farm employment) amounting to \$17,570, divided over the two seasons.

The variables Zb_{kjs}^- and Zs_{kjs}^- in equations (6) to (9) determine the value of the deviation in income below the target income. The expected shortfall from the target is calculated. The acceptable level of shortfall from target is given by λ_{buyer} and λ_{seller} for the processor and farmers respectively. These variables are introduced to enable the model to account for risk behaviour. For the processor, the target income (b^*) is set at \$38,000 in the base run, which is the annual fixed costs to operate the plant processing pepper. For the farmers' group, target income (s^*) is the lowest income they reported to be willing to accept before quitting to produce pepper, calculated at \$27,412 per year from survey data.

Equation (10) refers to the limitations in production, namely that the amount of fresh pepper traded in a season should be lower than a maximum of what can be transacted per season (30,000 kg, the production in 2000) multiplied by a capacity factor (cap) to

³⁰ We estimated the cost of one person travelling in the truck on every delivery: spending six hours for the trip and supervision at the processor's facility gate under processor's low opportunistic behaviour, and eight hours under processor's high opportunistic behaviour.

³¹ Governance and transport supervision costs are calculated taking into account the minimum labour cost for an agricultural worker, which was about \$1 per hour at the time of this research.

allow for production increases. Finally, constraints (Equations 11 and 12) are added to make the model integer, so that only one contract arrangement per season is selected. The model does not foresee the scenario where farmers trade part of the produce individually and the rest in a group contract. This set of equations was programmed in GAMS. The results are shown and discussed in the next section.

4. Results

4.1. Base run

Given the parameters defined above, the model is feasible in a price range from \$0.69/kg to \$0.96/kg (see also section 4.2). The average market price recorded in El Roble is the upper bound of the model. It is argued that at prices higher than \$0.96/kg farmers will continue trading in a group contract.

The base run considers a selling price of \$0.96/kg and a w is equal to 0.5 in the case of group contract and one for individual contracts. It is argued that in the case of individual contracts, the processor has most of the bargaining power, while farmers are price takers. Conversely, when w is equal to 0.5 the market power is shared between the processor and a collective of farmers in a bilateral monopoly. Producers have only one market where they can sell and the processing firm has only one partner to procure from.

The results of the base run predict that farmers will opt for a group contract with low opportunistic behaviour in both the low supply and high supply season. At \$0.96/kg, the firm should make \$ 35,839 in the low supply and \$38,092 in the high supply season. The farmers’ income as a group totals \$37,218 in the low supply season and \$42,480 in the high supply season. In each season a total of 60,000kg fresh pepper is traded. The average annual income per farmer is \$4,194.

We are interested in changes in market conditions that alter the contract specifications and therefore investigate the model parameters also at lower prices. The model was run at different levels of the various parameters (selling price, costs of contract and risk aversion) to investigate where the model predicts changes in the governance structure.

4.2. Selling price of fresh pepper

The model is feasible in the price range of fresh pepper between \$0.69/kg and \$0.96/kg (Figure 2). This suggests that the farmers withdraw from trading at a price below \$0.69/kg because at this price they will not earn the desired minimum income (which approximates the average income obtained from other agricultural activities).

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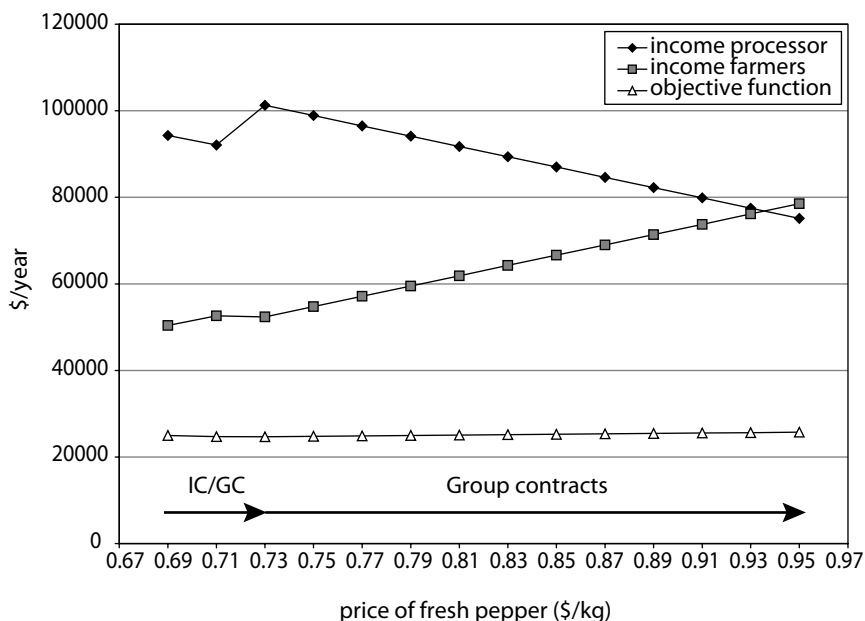


Figure 2. Effects of changing the price of pepper on expected income levels ($w=0.5$ in group contracts).

At selling prices below \$0.73, the model predicts that farmers prefer to deal with individual contracts under high opportunistic behaviour (IC) during the low supply season; and with group contracts under low opportunistic behaviour (GC) during the high supply season. At higher prices, the model predicts that group contracts under low opportunistic behaviour will prevail in both seasons.

Figure 2 shows that the income of the processor is decreasing up to the price where it switches to group contracts (\$0.73/kg), while the income of farmers slightly increases. This suggests that the processing firm is affected when individual contracts are chosen during the low season, and that any increment of the purchase price below \$0.73/kg of fresh pepper only contributes to worsen off the firm's earnings. This can be explained by the fact that under a selling price of \$0.73/kg, the gains for farmers from organising the collection and transport of the pepper during the low season are not high enough to offset the costs.

The model predicts that the best scenario for the processing firm implies a purchase price of \$0.73/kg, which is the switching point to group contracts for both seasons. The processor earns its maximum income while sharing its bargaining power with a group of farmers, who earn one of their lowest incomes (although still higher than the income earned at \$0.69/kg). It is interesting to note that a bilateral monopoly is attractive for the farmers only at \$0.75/kg or higher. Under this governance structure,

the income of the farmers group increases with 10 percent when the firm pays 5 cents more per kg (inside the range of procurement prices \$0.75 to \$0.85 per kg). In that case, the processor’s income drops by 6 percent. In general, the firm’s income drops when moving from seasonal individuals contracts to group contracts, up to the price of \$0.73/kg. Farmers’ income continually increases as they move towards higher selling prices under group contracts only with a higher selling price than \$0.74/kg. The best scenario for the firm is paying not more than \$0.73/kg and promoting collective actions among farmers.

4.3. Costs of contracting arrangements

We assume that the contracting structure is also determined by transaction costs. Individual contracts with farmers can be costly due to the manifold information, search, negotiation and monitoring activities needed to be put in place. These costs are quantified for the processing firm in the model. We argue that if these costs are increasing, it might become unprofitable for the processing firm to stick to its monopsonistic situation. In this case group contracts in a bilateral monopoly situation might be preferred. Table 2 presents the results of simulations under three price conditions, namely the base-run (0.96 \$/kg), the price when the governance structure shifts to group contracts in both seasons (0.73 \$/kg) and the prices when individual contracts are chosen for the low supply season (0.72 \$/kg). The first run attributes no coordination costs to the group contract, while in the second run individual contracts are made cheaper. The only shift in governance structure is found in the second run at a price of 0.73\$/kg where the model predicts that individual contracts give a higher value of the objective function than group contracts.

The effect of the farmers’ coordination and membership costs are shown in Table 3. In run 1 the farmers’ coordination and membership costs are eliminated. The costs are halved in the second run and are doubled in the third run. At the base-run price, the change in coordination and membership costs for the farmers does not seem to influence the governance structure. At a lower price of \$0.73/kg the base-run costs indicate a group contract. Yet when costs to organise a group contract are doubled (run 3), the model predicts that individual contracts will be chosen in the low supply season. At purchase price of \$0.72/kg, a drop in the coordination and membership costs will shift the coordination structure towards a group contract in the low supply season compared to individual contracts in the base run.

4.4. Risk aversion of farmers

In this scenario we show how different levels of risk averseness of farmers affect their selection of governance structure to deal with the processor. The Target MOTAD is a safety first model. It is designed to estimate feasible production plans which insure a minimum income level. Parametrising the λ in Equation (9) enables us to evaluate the risk-averseness of the farmers. For modelling that the group of farmers is risk-

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Table 2. Effect of changes in the processing firm's coordination costs at different purchase prices ($w=1$ for individual contracts; $w=0.5$ for group contracts).

Runs	Firm's coordination costs (\$/kg)			Governance structure			Income firm (\$/year)	Income farmers (\$/year)	Av. Income per farmer (\$/year)	Objective function
	GC ^a			Low supply	High supply	High supply				
	Low supply	High supply	Low supply							
1. Base run price at \$0.96/kg of fresh pepper										
Base run	0.035	0.024	0.031	0.020	GC.low-opp	GC.low-opp	73,932	79,698	4,194	25,795
Run 1	0.035	0.024	0.000	0.000	GC.low-opp	GC.low-opp	76,961	79,698	4,194	26,280
Run 2	0.000	0.000	0.031	0.020	GC.low-opp	GC.low-opp	73,932	76,698	4,194	25,795
2. Price at \$0.73/kg of fresh pepper										
Base run	0.035	0.024	0.031	0.020	GC.low-opp	GC.low-opp	101,256	52,374	2,757	24,702
Run 1	0.035	0.024	0.000	0.000	GC.low-opp	GC.low-opp	104,286	52,374	2,757	25,187
Run 2	0.000	0.000	0.031	0.020	IC.high-opp	GC.low-opp	91,656	54,822	2,885	25,018
3. Price at \$0.72/kg of fresh pepper										
Base run	0.035	0.024	0.031	0.020	IC.high-opp	GC.low-opp	90,975	53,718	2,827	24,586
Run 1	0.035	0.024	0.000	0.000	IC.high-opp	GC.low-opp	92,163	53,718	2,827	24,776
Run 2	0.000	0.000	0.031	0.020	IC.high-opp	GC.low-opp	92,760	53,718	2,827	25,157

^aIC stands for Individual contracts, GC for Group contracts.

Table 3. Effects of the change in farmers’ coordination costs at different selling prices ($w=1$ for individual contracts; $w=0.5$ for group contracts)^a.

1. Base run price at \$0.96/kg of fresh pepper		Memberships fee for GC (\$/kg)	Governance structure		Income firm	Income farmers	Av. income per farmer	Objective function
Farmers’ coordination costs (\$/kg)	GC in low supply season		GC in high supply season	Low supply				
Base run	0.1070	0.0250	GC.low-opp	GC.low-opp	73,932	79,698	4,194	25,795
Run 1	0.0000	0.0000	GC.low-opp	GC.low-opp	73,932	91,578	4,820	28,171
Run 2	0.0535	0.0125	GC.low-opp	GC.low-opp	73,932	85,638	4,507	26,983
Run 3	0.2140	0.0500	GC.low-opp	GC.low-opp	73,932	67,818	3,569	23,419
2. Price at \$0.73/kg of fresh pepper		Memberships fee for GC (\$/kg)	Governance structure		Income firm	Income farmers	Av. income per farmer	Objective function
Farmers’ coordination costs (\$/kg)	GC in low supply season		GC in high supply season	Low supply				
Base run	0.1070	0.0250	GC.low-opp	GC.low-opp	101,256	52,374	2,757	24,702
Run 1	0.0000	0.0000	GC.low-opp	GC.low-opp	101,256	64,254	3,382	27,078
Run 2	0.0535	0.0125	GC.low-opp	GC.low-opp	101,256	58,314	3,069	25,890
Run 3	0.2140	0.0500	IC.high-opp	GC.low-opp	89,871	51,342	2,702	23,751
3. Price at \$0.72/kg of fresh pepper		Memberships fee for GC (\$/kg)	Governance structure		Income firm	Income farmers	Av. income per farmer	Objective function
Farmers’ coordination costs (\$/kg)	GC in low supply season		GC in high supply season	Low supply				
Base run	0.1070	0.0250	IC.high-opp	GC.low-opp	90,975	53,718	2,827	24,586
Run 1	0.0000	0.0000	GC.low-opp	GC.low-opp	102,444	63,066	3,319	27,031
Run 2	0.0535	0.0125	GC.low-opp	GC.low-opp	102,444	57,126	3,007	25,843
Run 3	0.2140	0.0500	IC.high-opp	GC.low-opp	90,975	50,238	2,644	23,890

^aIC stands for individual contracts, GC for Group contracts.

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averse we started with low levels of λ_{seller} . Increasing λ_{seller} will reflect the reaction of a farmers' group that is less concerned about survival. Table 4 shows the results.

At a price of \$0.73/kg and with farmers' accepted shortfall from the target income (λ) of \$25,095, the model anticipates that the farmers will prefer group contracts for both seasons (base + run 1). This governance structure remains the same with less risk-averse farmers (run 4). Conversely, the contract choice changes, when we assume that farmers are less willing to take risks on any deviations of their income to the target income (λ below 18,000). The model predicts that more risk-averse farmers (runs 2 and 3) would go for group contracts in the high season and individual contracts in the low season. This would indicate that farmers drop the group contract in low supply seasons and get back to it when supply is high. The model runs show that the contractual choice is sensitive to the risk-profile of the farmers. Risk-averse farmers are less willing to assume the costs of the bilateral monopoly when pepper supply is low, while group contracting seems to be a good risk coping strategy, only when levels of supply are higher. The model becomes infeasible at very low levels of λ (lower than 10,000).

Table 4. Effect of different levels of risk aversion (selling price of pepper \$0.73/kg and $w=0.5$ in group contracts)^a

Runs	λ	Governance structure		Income processor (\$/year)	Income farmers (\$/year)	Average income per farmer (\$/year/farmer)	Objective function
		Low season	High season				
Base run	25,095	GC	GC	101,256	52,374	2,757	24,702
Run 1	18,000	GC	GC	101,256	52,374	2,757	24,702
Run 2	12,548	IC	GC	89,871	54,822	2,885	24,447
Run 3	10,000	IC	GC	89,871	54,822	2,885	24,447
Run 4	50,190	GC	GC	101,256	52,374	2,757	24,702

^aIC stands for Individual contracts, GC for Group contracts.

5. Discussion and conclusion

The model scenarios presented in this paper simulate the effects of collective action under initial monopsonic market conditions. The model tries to combine issues of quality, logistics, governance structures and market development. It is clear that all are interrelated and that changes in logistics as a result of changes in the governance structure may improve the quality of the delivered product. Furthermore, changes in the governance structure may affect the power relations between trading parties and thereby instrument market development to the profit of small-scale farmers.

Although the processor has monopsonic power, it needs to secure the procurement of pepper. As a monopsonist it has the largest bargaining power. Yet, it is expected that the processor will have to pay more for fresh pepper if the demand and, consequently, the processing volumes are increased: 'the price which a monopsonists must pay is generally an increasing function of the quantity it purchases' (Henderson and Quandt, 1980). It is therefore important for the processor to have a sustainable and trustful relationship with the farmers.

The model results indicate that low procurement prices of fresh pepper can make the farmers breach the group contract, even between different seasons in the year. It is furthermore shows that group contracts are only rational when higher prices prevail. To justify group contracts, the costs of organising collection and transport and the membership fee should be lower than the gains reached from the lower rejection rates. Furthermore, group contracting can be beneficial for risk-averse farmers in either the low or high season.

When group contracts are agreed upon and farmers organise themselves, a bilateral monopolistic situation arises. Henderson and Quandt (1980) identify three general outcomes that are possible: (1) one of the partners dominates and forces the others to accept price and/or quantity decisions; (2) trading partners reach an understanding and cooperate; and (3) trading does not take place as the market mechanisms break down. The difference between the first two options for the case of pepper is based on the difference in bargaining power. Contract farming and collective action are both important forms to reduce transaction costs, improving coordination and the bargaining power balance between the contracting parties. Hence, it can be expected that farmers will look for the implementation of group contracts all the time. Farmers may however hold-up the group contract if the price offered by the processor is too low (processor is then the price taker).

For farmers and processor to reach a sustainable arrangement, the processor needs to apply a price range in which group contracts are honoured. In this self-enforcing range, the farmers would not be likely to hold-up deliveries through collective actions, or in other words, they will not change their minds and break up group's activities (see also Gow *et al.*, 2000; Cocks and Gow, 2003). It can become costly for the company when it has to change its procurement regime every season, especially given the services that go along with each contract.

Also the seasonality of supply seems to influence the contract choice. The model forecasts a breach of the group contract under conditions of low supply of fresh pepper just because it becomes too expensive or unattractive. Arguably, if the production remains stable throughout the year, with regular weekly supplies and limited season variation, group contracts will be preferred all the time. However, it is unlikely that farmers will succeed without support. Pepper is produced in Costa Rica with a low technology and input package, and by using a resistant but low-productive plant variety (*Balankota*). Therefore, two notably different production seasons are

maintained, with unbalanced quantities of fresh pepper and irregular supplies from distinct categories of producers with rather varied production systems (Ruben and Sáenz, personal communication).

For the future development of pepper production in Costa Rica, an increase in productivity and stabilisation of production throughout the year is required, with the aim of increasing (and especially stabilising) the frequency of transactions, to improve the trust between actors, to encourage low opportunistic behaviour, and thereby strengthening the prospects for chain integration between the parties. This would require a re-structuring of current production systems, by progressively substituting the traditional low-yielding pepper plants with high-productive varieties that require higher levels of inputs. Yet, this restructuring may be too risky and expensive for low-income producers. Therefore, the firm might start by providing assistance to farmers to enable them to increase the productivity of the current variety. This can be done by changing the present market-specification contract into a production-management contract. Otherwise, under irregular supply throughout the year, seasonal contracts will still be the best scenario.

To conclude, we need to discuss some limitations of the model. The current model design only accounts for an increase in farmers' income under group contracts. Yet, we could consider other benefits derived from farmers' organisation that might be introduced into the model, such as input cost-sharing, technological spillovers, labour pooling and improved access to information (McDormick, 1999). Other shortcomings of the model also deserve attention. First, the model would benefit from a more precise estimation of the transaction costs for both the farmers and the company under different contractual arrangements. In particular, a better specification of the pure transaction costs would increase the precision of the model. Second, we did not account for the transaction costs of institutionalising the farmers' organisation. These costs might decrease the opportunistic behaviour of individuals in the group, since these sunk costs are lost when the group dissolves and turns back to individual contracts. Third, we did not take into account the seasonal variation in prices. Fourth, we disregarded the potential benefits of interlocking contracts forthcoming from the delivery of plant material and the provision of technical assistance by the company. Finally, we did not account for quality increase as a result of improved transport by the processing firm. Arguably, the firm will also profit in time and effort when pepper is less damaged during transport. Technological improvements initiated by the processing firm could also enhance the quality of the pepper delivered.

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Who is interested in good quality cocoa from Ghana?

Anna Laven

Abstract

Recently Ghana's reputation as producer of world's finest cocoa has been threatened by the purple bean disease. In this chapter the decline in quality performance is linked to recent shifts in global and local governance structures and the institutional framework surrounding the cocoa chain. The global cocoa chain is increasingly driven by international cocoa traders and chocolate manufacturers. The increasing risk for supplier failure, and the response of the international buyers to this risk, has resulted in a shift in demand for process conditions and functional capacities in favour of cocoa product conditions. However, international buyers that source cocoa from Ghana are still more interested in volume and quality than in the environmental and social conditions under which cocoa production is taking place. Also the Ghanaian government focuses primarily on product attributes and wishes to maintain its reputation as producer of premium quality cocoa beans. This has been one of the main reasons to choose a gradual approach towards liberalisation. Just like the international buyers, the Ghanaian government fears that further liberalisation affects the quality and the consistent supply of Ghanaian cocoa, as has been the case in fully liberalised cocoa-producing countries. Despite the gradual pace of the reforms quality performance in Ghana has recently declined. This decline cannot be explained fully by the increased control of international cocoa buyers over the chain but requires more knowledge on local (sector) characteristics and institutions, which play a vital role when it comes to knowledge management and extension services, both important determinants of quality performance.

1. Introduction

'Ghana grows the finest cocoa in the world' (Wallace, 2003). The Ghanaian government wishes to maintain this reputation as producer of good quality cocoa beans, for which it receives a premium on the world market. This has been one of the main reasons to choose a gradual approach towards liberalisation. While other cocoa-producing countries in West Africa—where cocoa production is concentrated—have fully liberalised their marketing and pricing systems and privatised quality control, in Ghana the state-owned marketing board (Cocobod) is the sole exporter of cocoa beans and regulates domestic marketing. Ghana is the only country where price stabilisation still exists and final quality control remains in hands of the Quality Control Division (QCD), which is a subsidiary of Cocobod. Nevertheless, international buyers have recently

rejected Ghanaian cocoa beans for being infected with the ‘purple colour disease’³². According to Cocobod representatives, this is the result of the gradual reforms, which introduced competition among local buyers of cocoa. It is generally believed that because certain Licensed Buying Companies (LBCs) do not encourage farmers to continue their traditional good farm practices, a high percentages of inferior beans have come on the market. It seems that—despite the gradual pace of the reforms—the Ghanaian government has failed to provide LBCs and cocoa farmers with the appropriate opportunities and incentives to continue devoting energy to good quality performance.

In this study, I will link the recent decline in cocoa quality in Ghana to shifting power relations and recent changes in the institutional framework surrounding the global cocoa chain as well as the local production chain. I will start with a short introduction on Global Value Chain (GVC) analysis in section 2. A GVC analysis will provide the framework for a qualitative assessment of changes in global (vertical) networks and how these are linked to local quality performance. In section 3 the focus will be on local (horizontal) networks. I will look more closely at how local governance processes and recent reforms in the cocoa sector in Ghana have affected quality performance and the conditions under which premium quality cocoa is being produced. I will conclude in Section 4 with a discussion on the interaction between vertical and horizontal networks in steering the direction of quality performance in the Ghanaian cocoa chain and possible trade-offs. In the conclusion, I will also present some reflections on how tensions within the current governance regime affect not only quality performance but also the extent to which farmers are in- or excluded from participation in the chain.

This paper is based on qualitative and quantitative data collected during two period of fieldwork carried out in 2003 and 2005. During my fieldwork I conducted two farmer surveys, in four regions of Ghana where cocoa production is concentrated (Western region, Brong Ahafo, Ashanti and Central region). The farmer surveys consisted of interviews with 200 cocoa farmers (landowners and sharecroppers) from 34 different communities, and were carried out with the support of private farmer extension services (Wienco) and Conservation International Ghana (for transportation and introduction) and several experienced research assistants, referred to as Farmer Survey (FS) 2003 and FS 2005. Within one third of the communities focus group discussions were held. In 2005 in-depth interviews with farmers as well as other key stakeholders within Ghana and in the Netherlands were carried, as well as a survey among cocoa processors and chocolate manufacturers.

³² Purple beans refer to low-quality beans with a purple colour. The main reason for purple beans is a lack of adequate fermentation.

2. Governance and quality performance in Global Value Chains

Global Value Chain (GVC) analysis is designed to identify upgrading strategies for medium- and small scale entrepreneurs in developing countries. Upgrading is seen as a requirement for firms in developing countries to remain competitive on the world market. Global Value Chain (GVC) analysis has its roots in world systems theory and dependency theory. Using a political economy of development and underdevelopment perspective, Gereffi (1994) outlines the Anglophone Global Commodity Chain (GCC) approach. It was primarily used for analysing the impact of globalisation on industrial commodity chains and attempted 'to develop a unified theoretical framework which can identify appropriate production and marketing strategies and key points for upgrading for firms within particular types of commodity chain in order to change existing power relations within the chain' (DFID, 2004)³³. The value chain literature views inter-firm co-operation within the chain as the source of competitive advantage (Humphrey and Schmitz, 2000: 14). Gereffi distinguished four dimensions in value chains: (1) their input-output structure, (2) the geographic areas they cover, (3) their internal governance structures, and (4) the institutional framework which sets the local, national and international conditions and policies shaping the situation of the various enterprises involved in the chain (Gereffi, 1999 in Gibbon, 2001).

Thus far, internal governance structures have received most attention in GVC analysis. Within this context governance refers to power relations, which determine how economic surplus is distributed within the chain. Recently, more emphasis is devoted to the institutional framework surrounding chains (Gibbon, 2001; A. Laven and I. Baud, personal communication). The institutional framework is important, because it provides either effective channels through which quality criteria can be introduced as part of upgrading, or it creates barriers against such introduction. Including the institutional framework recognises that commodity chains are no 'closed systems', but that they receive inputs from outside in terms of knowledge management (i.e. technical research institutes, extension services), are influenced by advocacy movements (i.e. trade unions, NGOs working on environmental or social issues), and by policy priorities set by national governments or international organisations (e.g. WTO, WB, or UN agencies) (A. Laven and I. Baud, personal communication).

Gereffi (1999) distinguishes two types of commodity chains, in which the position of producers vary. Producer-driven chains are found in capital- and technology-intensive sectors. Technical knowledge and high levels of capital use tend to prevent new producers from entering these sectors. Multinationals are the central players in such chains, which tend to be complex and multi-layered, with international subcontracting in more labour-intensive parts of the process. In contrast, buyer-driven chains can be found in sectors which are more labour-intensive, but where design and marketing are centrally controlled (e.g. garments and footwear). Both chains are seen as vertical networks. In buyer-driven chains large retailers, branded marketers,

³³ DFID is the abbreviation for the Department for International Development in the United Kingdom (UK).

branded manufacturers are the so-called 'lead firms' and they act as strategic brokers in linking producers and markets, based on their knowledge regarding strategic research, marketing and financial services (Gibbon, 2001; Gereffi, 1999). Lead firms (as a group) control certain functions that allow them to dictate the terms of participation by other actors in different functional positions in the value chain. Immediately upstream of lead firms are other powerful agents that do most, or at least some, of the day-to-day work of chain coordination. These firms are defined as first-tier suppliers. First-tier suppliers have their own suppliers, so-called second-tier suppliers, which can have their own suppliers, and so on (Gibbon and Ponte, 2005: 99-104).

The necessity to broaden the focus of value chain analysis to include primary commodities has been pointed out by Cramer (1999 in Gibbon, 2001: 350) because these commodities 'are developing countries' main current link to the global economy' as they often provide the main source of employment, income and foreign exchange for many developing countries. Although 'lead firms' capture a variety of firms, it has been argued that the classification of buyer-driven versus producer-driven does not reflect governance patterns in agricultural commodity chains. In response, Gibbon (2001) proposed a third type of chain, referred to as 'the international trader-driven chain'. International traders govern a growing number of agricultural commodity chains (e.g. coffee, cocoa, cashew) (Fold, 2002; Gibbon, 2001; Kaplinsky, 2004). Gibbon has attempted to give some general characteristics of international trader-driven chains:

- Relatively low value-to-weight ratios, with labour-intensive direct raw material production functions and with otherwise low barriers of entry to this function.
- A globally dispersed and locally discontinued (including seasonal) supply pattern [...].
- Strong tendencies toward market saturation [...].
- A final (or intermediate) demand side which is also dispersed (e.g. cotton), or concentrated but segmented with respect to commodity variety (e.g. coffee and cocoa) (adapted from Gibbon, 2001: 351).

The distinction made between producer- and buyer-driven chains has been opposed from another perspective. According to Fold (2002: 230) this 'crude dichotomy [...] fails to acknowledge the more complicated patterns of power relations between lead firms in global chains—or, at least those for agro-industries'. '[...] This distinction does not help specify the dynamics of "driven-ness" in certain global chains'. So, it can be argued that value chains are more complex than presented by Gereffi; 'there are intermediate roles and positions possible, where firms may not be able to control all parts of the chain, but are capable of controlling certain parts of it' (Smakman, 2003: 26).

The idea of 'degrees of governance' is confirmed if we take a closer look at agricultural value chains, which are becoming 'increasingly buyer (or trader)-driven' (Fold, 2002; Humphrey and Schmitz, 2000). This increased control of international buyers/traders over the chain partly resulted from the need to take over tasks that prior to

liberalisation were the responsibilities of the state. The reduced involvement of the state in marketing and the provision of services made traders more vulnerable to possible flaws in the performance of their suppliers in developing countries (Humphrey and Schmitz, 2000, 2002).

A second explanation for the increased 'driven-ness' is the trend that international traders, manufacturers and retailers in agricultural export commodities have become stronger entities in these chains due to takeovers and an increase in the scale of their operations (Oxfam, 2004). While these multinationals have become more powerful, the position of producers of agricultural export commodities in GVCs has not improved.

A third explanation is the increased importance of 'quality' as one of the main parameters for competitiveness. Quality no longer refers simply to product characteristics but encompasses a wider variety of criteria, including environmental and labour conditions (Marsden, 1997: 174). Consumer organisations and Non-Governmental Organisations (NGOs) are increasingly confronting multinationals with demands for corporate social responsibility at local and international levels (Dyllick and Hockerts, 2002; Helferich, 1999). Changes in demand entail risks for both international buyers/traders as well as for local suppliers who are obliged to bear the costs of compliance to new standards, and run the risk of exclusion if they fail to do so. Problematic however, is the fact that the voices of suppliers and their local representatives are systematically excluded from corporate as well as international standard-setting. This fortifies the expectation that suppliers in developing countries find these changing requirements difficult to meet as they often do not (yet) apply to their domestic markets (Keesing and Lall, 1992 in Humphrey and Schmitz, 2000). However, the increasing demand for specific product and production process attributes also creates opportunities, as it led to international buyers/traders starting to actively search for new and stronger alliances with local suppliers. Suppliers able to meet new standards can generate a comparative advantage over others.

Within this context it is necessary to make a distinction between the overall way a chain is being governed and chain coordination. 'A GVC may be characterised by different forms of coordination in various segments, yet a relatively coherent form of overall governance' (Gibbon and Ponte, 2005: 163). There are different ways of categorising chain coordination. Humphrey and Schmitz (2002: 7) focus on 'inter-firm relationships and institutional mechanisms through which non-market coordination of activities in the chain is achieved'. In earlier work they distinguished three types of relationships: (1) 'network relations' based on co-operation between 'equals'; (2) 'quasi-hierarchy', combining cooperation with asymmetrical power relationships in which buyers dominate over suppliers; and (3) 'hierarchy', associated with vertical integration, in which the buyer takes direct ownership of the operations (Humphrey and Schmitz, 2000).

When buyer and supplier do not need to collaborate in product definition, because either the product is standard or the supplier defines it without reference to particular customers, the term ‘arm’s-length market relations’ is used. In the literature, arm’s-length market relations are often considered a fourth type of chain coordination. In buyer- (or trader) driven agricultural value chains it is expected that the increased risks for supplier failure will result in a shift from arm’s-length relations to more active forms of cooperation between buyers/traders and suppliers, such as network and quasi-hierarchical relations (Humphrey and Schmitz, 2000). According to Gibbon and Ponte (2005: 163) this shift towards ‘hands-on’ forms of coordination is not necessarily the case. It depends on whether the chain becomes more inclusive (as Gibbon describes for agricultural chains, or more exclusive, such as Humphrey and Schmitz suggest for manufacturing chains). Gibbon has suggested that commodity chains for primary commodities may be more inclusionary because traders utilise a looser form of chain coordination, because they are more interested in functional capacities (such as volume) than margins.

2.1. Quality performance in the cocoa chain

Cocoa is an internationally traded commodity, with a total production of around 3 million tonnes, and a value of around 6 billion US\$ (Gresser and Tickell, 2002). It is estimated that there are approximately 14 million workers worldwide involved in cocoa production, and some 10 million workers in Africa alone (ICCO, 1999). Originally, the cocoa tree grew in the tropical rainforests in the western Amazonian region (Brazil) and in Mexico. Once established in Ghana, cocoa production expanded rapidly and by the mid-1920s Africa became the main producer. Nowadays, West Africa is responsible for around 70 per cent of the worldwide production of cocoa. The world’s largest producer Côte d’Ivoire is responsible for nearly 35 per cent of global supply, followed by Ghana with slightly more than 18 per cent (FAOSTAT, 2005). Other important cocoa-producing countries in West Africa are Nigeria and Cameroon. Before market reforms in West Africa, cocoa in this region was produced and marketed under state-controlled systems. Different marketing and pricing systems were used in the different cocoa producing countries. Anglophone countries produced under the marketing board system, whereas Francophone countries made use of the stabilisation fund. Historically low cocoa prices in the mid 1980s were the incentive for liberalisation, introduced as part of the Structural Adjustment Programmes (SAPs) by the World Bank. The assumption was that reforms would enable increased producer prices by reducing the costs of inefficient marketing and pricing systems and by improving efficiency of related cocoa activities. All West African cocoa producing countries undertook some reforms. Cameroon and Nigeria initiated drastic reforms, while Côte d’Ivoire and Ghana opted for a more gradual approach to liberalisation.

Partly as a result of the SAPs, the cocoa chain is increasingly driven by international processors/traders of cocoa and to a lesser extent by chocolate manufacturers (Kaplinsky, 2004). In recent discussions on chain governance in the cocoa sector, the chain has been characterised by ‘bipolar’ governance (Gibbon and Ponte, 2005;

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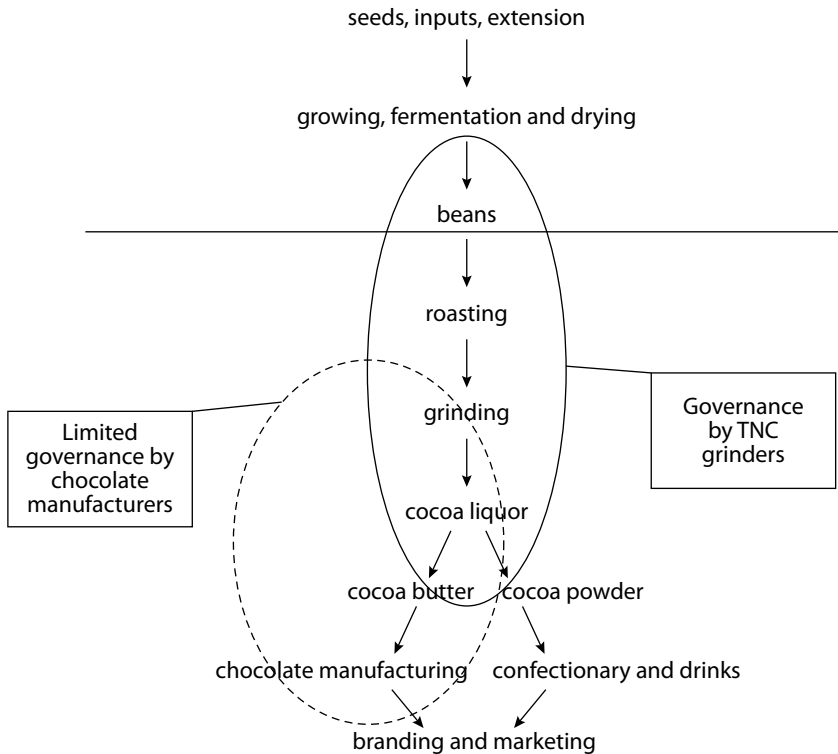


Figure 1. Governance in the cocoa chain after the SAPs (>2000) (Kaplinsky, 2004).

Kaplinsky, 2004; Losch, 2002). ‘One pole arises from the concentrated [*concentration*] amongst the grinders [processors/traders]³⁴, who increasingly have operations in both producing and consuming countries, and many links in the chain. The second pole is the large chocolate manufacturers; but their operations are much more limited along the chain, and their governance is much weaker than that of the grinders. In most cases it only extends to the relationship between the grinders and the chocolate manufacturers’ (Kaplinsky, 2004: 24-5). Figure 1 (adapted from Kaplinsky, 2004: 25), shows the current governance regime in the global cocoa chain. The vertical line between ‘beans’ and ‘roasting’ indicates the point from which cocoa beans are being processed in cocoa-products.

Prior to SAPs the marketing boards (or stabilisation funds) governed the first three stages of cocoa production. The state determined ‘who participates in the chain and

³⁴ For the cocoa processing industry (cocoa grinders) it is estimated that by the mid-1990s 70 per cent of all cocoa grindings were conducted by the top ten corporations, with three corporate giants accounting for 50 per cent (Archer Daniels Midland (ADM), Cargill Inc. and Barry Callebaut (<http://www.eftafairtrade.org>)).

to what standards they perform, and in activities designed to upgrade performance amongst chain members' (Kaplinsky, 2004: 22). Ghana is presented as exceptional case since the state—through Cocobod—currently still coordinates the cocoa production chain. However, also Ghana is confronted with changes in demand of international traders, chocolate manufacturers (and consumers) and one can see an increased involvement of these multinationals in supply chain management. According to Losch (2002: 225) 'the old national standards have now been replaced by grinders' reputation for compliance with the (demanding) specifications of chocolate manufacturers (concerning timing, volume and quality)'. The leading position of cocoa processors and chocolate manufacturers in the chain becomes clear when we look at the broader institutional frameworks in which these multinationals operate, as they are able to reshape institutions (e.g. by lobbying). An example of this is the 'chocolate war', which refers to debates among members of the European Union about the maximum content of cocoa butter substitutes allowed in 'real chocolate'. It has been decided to allow a maximum of 5 per cent cocoa butter substitutes (Gibbon and Ponte, 2005). This gives chocolate manufacturers and processors more flexibility in their sourcing at the cost of cocoa producing countries, which face decreases in demand.

The power held by cocoa processors also becomes clear by looking at their ability to innovate and become main gatekeepers of knowledge. According to world's largest processor ADM (1999 in Fold, 2002: 233) 'it has become technically possible to compensate for variations in bean quality without compromising customers' demand for intermediate goods with specific properties'. These technological innovations, enabling cocoa processors to generate 'variety/quality' in the liquoring process, instead of in the earlier growing stage, no longer requires sourcing multiple varieties of beans from different regions (at least not for quality reasons). The only cocoa beans still consistently separated by national origin for grinding purposes are those from Ghana (Gibbon and Ponte, 2005: 135-136), implying that quality characteristics have become less important for processors and most cocoa producing countries.

For suppliers of cocoa this can be positive when producers have difficulty meeting quality standards or have a costly system of quality control. For others, however, who used to have a comparative advantage over others by producing quality cocoa, it can have a negative effect. The power of cocoa processors in the market is also illustrated by the role they played in undermining the International Cocoa Agreement (ICCA), which used to regulate the stabilisation of cocoa stocks. Due to the increasing levels of industrial concentration, processors and traders were able to manage a giant stock of cocoa, equalling two thirds of the total volume (Gibbon and Ponte, 2005; Kaplinsky, 2004).

Players operating outside the chain also have considerable influence on how the cocoa chain is governed. For example, the shift in performance requirements for cocoa from product quality to the 'quality' of production processes demonstrates the power of advocacy movements. The interest in the way products are produced is partly the result of a growing concern among consumers for sustainable development issues. Within

this context also reputation and legitimacy of multinational operations start to play a role as they are held responsible to some extent, for local production conditions. It is generally agreed that ‘multinationals are now in the position where their behaviour has a significant effect on the health of an important export sector and therefore national development’ (Abbott *et al.*, 2005: 8).

In the cocoa sector this is reflected by the recent claims on child labour in the West African cocoa sector. A BBC documentary, broadcast in September 2000, claimed that ‘90 percent of cocoa plantations in cocoa-exporting African nations use forced labour, suggesting that a significant percentage of this forced labour is children’ (Walden Asset Management, 2001). Although these allegations were highly exaggerated, it resulted in wide protests against chocolate makers by consumer organisations, NGOs and policymakers. As a response to these accusations, U.S. members of Congress and global chocolate manufacturers announced a comprehensive plan to address child slavery on West African farms and in the cocoa-chocolate sector worldwide³⁵. The chocolate industry responded as well, by organising themselves under the auspices of the World Cocoa Foundation (WCF). WCF provides funding to the International Labour Organisation (ILO) to study the labour situation on cocoa farms and has supported the creation of the Sustainable Tree Crop Programme (STCP), a public-private partnership between industry, producers, researchers, government agencies, public sector institutions and conservation groups (www.treecrops.org; Abbott *et al.*, 2005: 9). The STCP focuses on issues of sustainable rural development in cocoa-producing areas in West Africa. In 2003 the STCP started a country office in Ghana, which is currently experimenting with the provision of farmer-based extension services through the set-up of Farmer Field Schools (FFSs), with a focus on environmentally friendly and socially responsible farm practices. In Ghana it is difficult for the chocolate industry to find other ways of dealing directly with farmers and their local buyers, other than through Cocobod. In other, fully liberalised cocoa-producing countries, direct trade relations between buyers and farmers (mainly through farmer cooperatives) are more common. World’s largest processors of cocoa already buy around 50 per cent of the cocoa beans in Côte d’Ivoire directly from cooperatives and give them financial support and advice (Interviews with cocoa processors, 2005). They argue that, in general, farmer cooperatives produce better quality cocoa than individual farmers, and that it is more efficient to buy directly from cooperatives (instead from middlemen).

The increasing risk for supplier failure, and the response of international traders and chocolate manufacturers to this risk, has resulted in a shift in demand for process conditions and functional capacities in favour of cocoa product conditions. However, international traders that source cocoa from Ghana are still more interested in volume and quality than in the environmental and social conditions under which cocoa production is taking place. In Ghana, demand for premium quality cocoa

³⁵ It is known as the ‘voluntary’ Harkin-Engel Protocol, signed on the first of October 2001

has remained intact (and is even growing), although the height of the premium has decreased considerably since the appearance of the purple beans.

The increased control of international cocoa traders and chocolate manufacturers over the chain and institutional changes that occurred does not provide any direct explanation for the recent decline in quality performance in Ghana. Understanding the recent changes that have taken place in Ghana requires more knowledge on local (sector) characteristics and institutions, which play a vital role when it comes to knowledge management and extension services, both important determinants of quality performance.

A well-known critique on GVC analysis is that it tends to ignore the importance of local inter-firm co-operation, local governance, and the role of government and international regulation (Smakman, 2003; Vargas, 2001; Humphrey and Schmitz, 2000). The necessity to combine theories on local economic development with the value chain theory has been indicated by several authors (e.g. Lambooy, 2002; Van Westen, 2002; Humphrey and Schmitz, 2000; Palpacuer, 2000). Therefore, in the next section I will examine the local determinants of quality performance and local governance structure, which will enable us to look more closely at whether global and local governance processes reinforce or block each other.

3. Local determinants of quality performance

In Ghana, 'quality' has remained an important feature of cocoa beans. The quality of cocoa beans in Ghana is classified in different categories (main crop beans, light crop beans, small beans, remnant beans and type 4 beans). The main determinants of the production of premium cocoa are good fermentation and adequate drying of cocoa (see Figure 2). For the production (and consistent delivery) of premium quality cocoa farmers and Cocobod are awarded with a higher price than for conventional cocoa, ranging from an extra \$ 50-80 per metric ton. However, in the last cocoa season 2004/2005, the buyers reduced the premium of Ghana cocoa beans from \$ 80 to \$ 20 because of a decline in quality (GAIN, 2005).

In Ghana generally, the main focus with respect to cocoa quality is on its product characteristics. The Ghanaian quality control system is under control of the QCD, a subsidiary of Cocobod. Before official quality control takes place by QCD cocoa farmers have two moments of 'bean selection'. The first moment is after harvesting the cocoa pods. When they break the cocoa pods, infected pods are thrown away together with the cocoa seeds (the beans). The second selection occurs after the good pods have been broken, and good beans selected. Purchasing Clerks (PCs), who are hired by LBCs to buy the cocoa from the farmers at the community level, are responsible for the first official quality check, at the moment of buying the beans. 'They are to buy cocoa which is thoroughly dry, of uniform bean sizes, not salty, not germinated or broken, and no evidence of adulteration' (Interview QCD – Deputy Executive Director, Joseph

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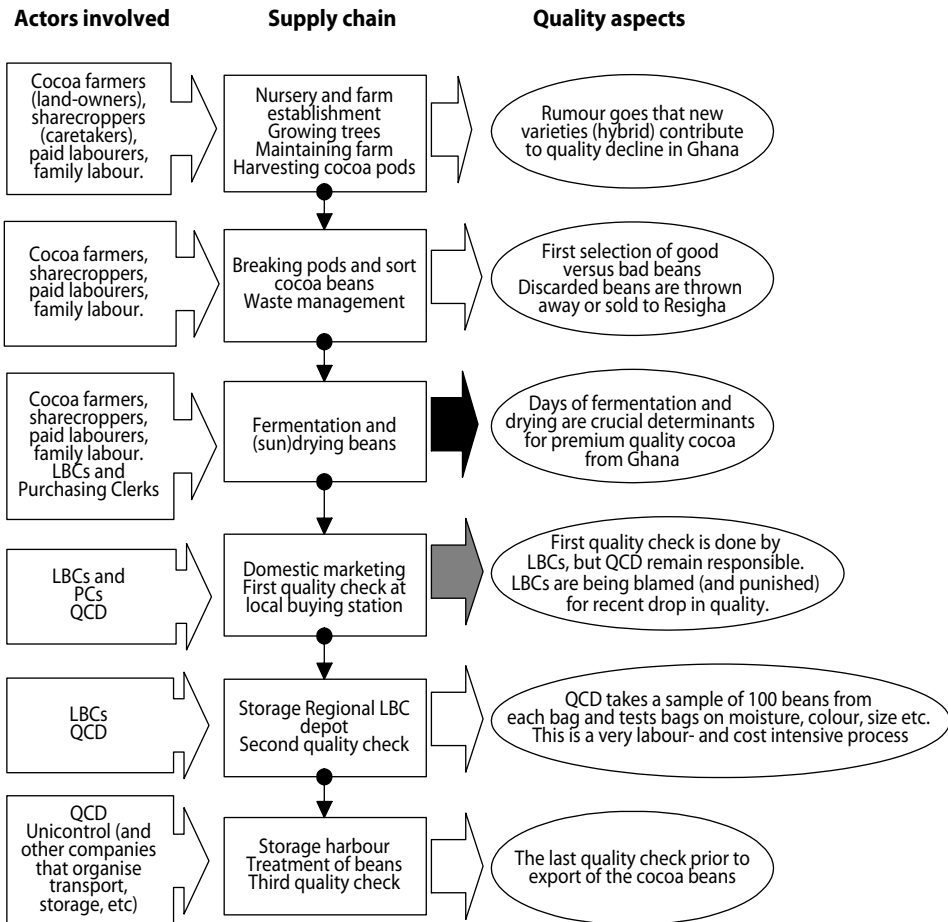


Figure 2. Actors involved in the production of premium quality cocoa.

Buatsie, 12-5-2003). At this stage, the rejected beans are thrown away or sold (at a very low price) to a Dutch company Resigha, which processes low quality cocoa-products. Next, the QCD tests the cocoa at the central buying centres of the LBCs, where they take a sample of 100 beans out of each bag and grade and seal the cocoa bags. A third check takes place in the harbour, prior to export, by the same QCD personnel. The high quality uniform main crop beans are prepared for export (and the high quality light crop beans are sold for processing). As part of this last check QCD carries out 'fumigation and disinfection of beans to ensure that only insect free cocoa beans are exported. In addition, rodent control is also carried out in all cocoa storage premises to prevent damage to the beans in storage' (GAIN, 2005: 5).

In 2005, Ghanaian beans infected by the 'purple colour disease' were rejected on the world market, and the premium for Ghanaian cocoa was reduced. In Ghana this has been blamed on poor fermentation by farmers and a lack of quality control by LBCs and their PCs. As a response, Cocobod has announced that it will declare all bags of cocoa with more than 25 per cent of purple beans as sub-standard, and pay only half of the producer price to the LBCs (Daily Graphic, 2005). Meanwhile, LBCs have already paid farmers and it will be very difficult to recover those costs. As a result, most LBCs currently have stopped buying cocoa from farmers, with knock-on effects on other economic activities in cocoa-growing areas. Other sources, including the farmers and LBCs, argue that the decline in quality results from lower quality beans being smuggled from Côte d'Ivoire. Although difficult to estimate, unofficial sources indicate that between 120,000-150,000 tonnes of cocoa beans (on a total production of 715,000 tonnes in the season 2003/2004) have been mixed with Ghanaian beans (GAIN, 2005).

NGOs and researchers who work in Ghana have expressed the importance of further research on costs and benefits of producing premium cocoa during a workshop on 'Towards a Sustainable Cocoa Chain, a Ghanaian Perspective' held in Ghana in 2005. They stressed that it is not clear to what extent farmers benefit from the production of premium cocoa (Laven, 2005a). In Ghana there is no price-differentiation for cocoa beans; only good quality beans are accepted for further processing and export. In a way, farmers have to conform to outside interests by producing good quality cocoa, which is a time-consuming and labour-intensive process and requires a costly quality control system. When beans are rejected, the risks are partly shifted towards buying companies and farmers. Especially for farmers, the burden is much higher than for (for example) the Ghanaian government as it directly affects farmers' livelihoods.

3.1. Gradual marketing reforms in Ghana and their impact on quality performance

Quality performance, and the conditions under which the cocoa is produced, has been also affected by the gradual process of liberalisation. Reforms in Ghana started as far back as 1981. As part of the Economic Recovery Programme (ERP), reforms in the cocoa sector were implemented through the Cocoa Rehabilitation Project (CRP) and the Agricultural Sector Adjustment Programme (AGSAC). The CRP put emphasis on reform of the cocoa sector and liberalisation of Cocobod and its subsidiaries, attempting to stop its declining production trend (Ministry of Finance, 1999; Fold, 2002). One way of doing so was by increasing the share cocoa farmers get of the Free on Board (FoB) price (i.e. producer price). As a result of the reforms in Ghana, the producer price increased from 56 per cent for the cocoa season 1998/99 (Ministry of Finance, 1999) to over 70 per cent in 2004/05. As intended, the higher producer price stimulated the use of improved technologies which contributed to a recovery of cocoa production. In evaluations of the World Bank this direct relation between reforms and an increase in producer price and higher volumes of production has been reason to assess positively overall reforms in the cocoa sector (Akiyama *et al.*, 2001).

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Prior to liberalisation Cocobod was the main driver of the chain in control of external and domestic marketing and there was only one (state-owned) buying company, the Produce Buying Company (PBC), who hired PCs to buy cocoa in communities. Different subsidiaries of Cocobod provided support and services for the farmers (see Figure 3). The Cocoa Marketing Company (CMC) sold all cocoa beans to buyers overseas, who were responsible for roasting, grinding, making cocoa products and the branding and marketing of products. Prior to liberalisation the Cocoa Services Division (CSD) was responsible for providing extension services to cocoa farmers and had a monopoly on the procurement and distribution of inputs. Banks provided credit. The Research and Development Institutions were mainly local; the main research institute is Cocoa Research Institute Ghana (CRIG), also a subsidiary of Cocobod.

Cocobod continues to determine the producer price of cocoa and is still the sole exporter of cocoa beans. Through a system of forward sales, Cocobod still manages to pre-finance the cocoa. Furthermore it is responsible for regulating the internal marketing of cocoa. Although Cocobod is still the main coordinator of the cocoa production chain it has lost some of its power to the private sector as well as to civil

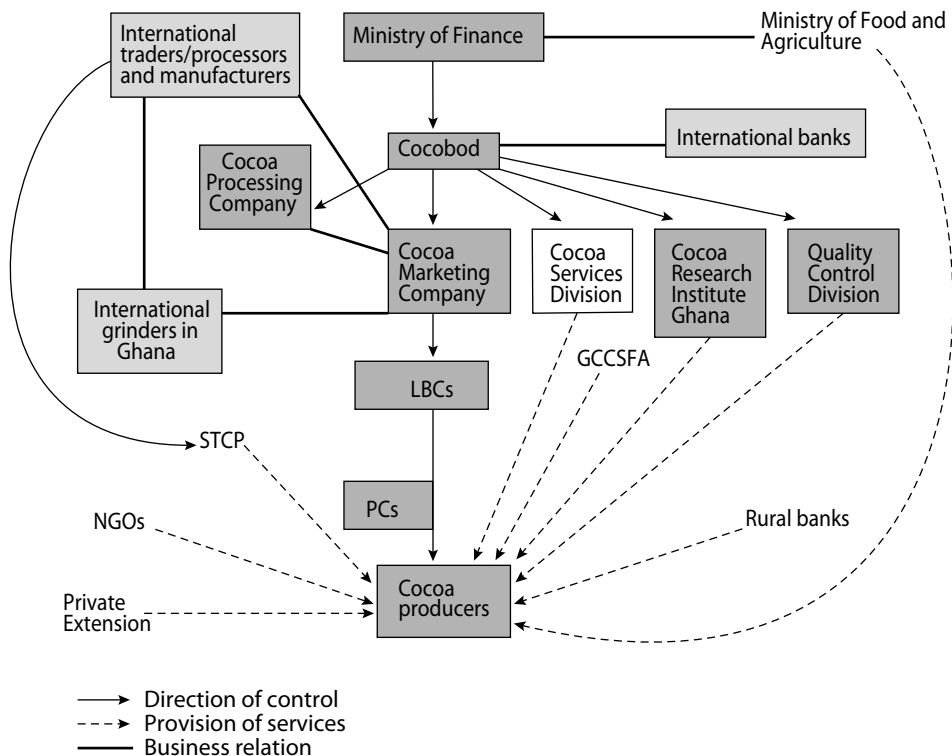


Figure 3. The involvement of different actors in the cocoa chain in Ghana.

society. As a result of the reforms the staff level of Cocobod decreased drastically³⁶. The reforms introduced competition among local buyers of cocoa. Besides this marketing reform some institutional changes occurred. In 1995 the Ghanaian Coffee Cocoa Sheanut Farmer Association (GCCSFA) took over the task of CSD of the distribution of inputs. Cocoa extension services merged with the extension wing of the Ministry of Finance (MoFA). Alternative providers of extension services have also entered the field. The Cocoa Research Institute Ghana (CRIG) has remained the main research body involved in the cocoa sector in Ghana and QCD has remained responsible for quality control.

One of the major reforms in Ghana was liberalisation of domestic marketing. Until 1992 the state-owned PBC was the only buyer of cocoa. With the liberalisation of domestic marketing, private LBCs entered the cocoa sector and started buying cocoa as well. The idea was that the price set by the government would then function as the administrative/floor price. However, it has turned out that LBCs do not compete on prices they pay to the farmers. All LBCs pay the floor price as set by the government, even though a small number pay something extra in the form of bonuses. But generally, buying companies claim to look for other ways to ensure that farmers sell (only) to them, such as prompt payment and social involvement with farmer communities (FS 2003). LBCs receive a yearly fixed 'buyer's margin', set by the government, which has declined over the last few years³⁷. All buyers, including PBC, have to keep to this percentage and have to obey different kinds of rules and regulation. Also PCs, who are hired by LBCs on commission basis³⁸, can only increase their income by buying higher volumes of cocoa. This reduces the incentive for PCs and LBCs to be very strict about quality control, also because farmers can choose to whom they sell their cocoa. If LBCs and their PCs reject the cocoa it is likely that other buyers will accept the beans. As a response, some LBCs have decided to dry the cocoa beans themselves. Paying bribes to QCD officials is another utilised option to get away with selling not thoroughly dried and adequately fermented beans. LBCs are suspected of pressurising farmers to sell their beans before adequate fermenting and/or drying have taken place (Asenso-Okeyere, 1997: 117).

Following the introduction of competition in the domestic marketing of cocoa, the government decided to allow qualified LBCs to export part of their cocoa purchases, with effect from October, 2000 (www.finance.gov.gh). It was decided to start the liberalisation of external marketing with a 70:30 split between the CMC and the LBCs. The rationale behind this transition period was that it would allow LBCs to become familiar with external marketing and to acquire the necessary techniques. At the same time it would allow CMC to continue with forward selling in order to maintain the

³⁶ In the early 1980s there were approximately 100,000 people employed by Cocobod while in 2003 this number was only 5,140. Many former employers of Cocobod are still involved in the cocoa sector, as private consultants, providers of extension services and/or as buyers of cocoa (Ministry of Finance, 1999).

³⁷ This decline in buyers' margin is directly related with the increase in producer price paid to the farmers.

³⁸ There is only one LBC (named Armajaro) that pays PCs a salary.

fixed producer prices. One of the lessons learned from the experiences of other cocoa-producing countries with respect to the reforms was that a lack of professionalism among buyers created considerable losses in quality. The transition period was planned to end in the season 2002/03, at which point a decision was to be taken on whether full liberalisation of the external market would be the best strategy to follow.

However, from the interviews conducted with several representatives of the Ghanaian government and Cocobod, it seems that they are in no rush to implement further reforms. According to them, the buying companies are not ready to export and/or are not interested in exporting directly. This contrasts with the information gathered in interviews held with different LBCs. Various LBC representatives argue that certain local private buyers do meet the requirements, but that Cocobod deliberately hinders their involvement in export activities. Most LBCs do not complain about these practices as they depend on Cocobod for their license to buy cocoa (Interviews with LBCs and representatives of Cocobod, 2005). The result is that—despite the changes in regulations—in practice none of the LBCs currently exports cocoa directly to international buyers, which means that CMC continues to handle all external marketing of cocoa beans, cocoa liquor and cocoa butter. The high volumes traded by CMC enable offshore borrowing to finance local purchases. Due to the reliable marketing system Cocobod and CMC enjoy a high reputation for contract and quality fulfilment, for which they receive a cocoa premium on the international market. Because the price is still determined before the crop is harvested, farmers are guaranteed reliable income (even if the price of cocoa in the world market falls in the course of the purchasing period), and government is similarly assured of its revenues from cocoa (Ministry of Finance, 1999: 83). The current organisation of the cocoa sector in Ghana is considered beneficial for international cocoa traders and chocolate manufacturers as well. Ghana's recent achievements in terms of attaining an increased producer price as well as a boost in the production of cocoa beans, together with the negative experiences in other cocoa producing countries that have liberalised the cocoa sector, seem also to have convinced the World Bank that for now, further reforms are not a priority in Ghana (Interview, Mr. E. Dwumfour, World Bank Ghana, 2005). Local cocoa buyers, however, feel misled and (some of them) are frustrated about the current standstill of the liberalisation process.

Under Ghana's current governance regime, which is supported by multinational buyers of cocoa, most LBCs have remained rather weak actors. If they are to fulfil a crucial role in the current transition process, as argued by Fold (2002), they should be trained and/or supported instead of being slowed down. In Ghana, a situation has arisen in which the government does not enable, but instead hinders local private buying companies in optimising their operations, jeopardising their future ability to compete with foreign buyers. As a result, also farmers are worse off, as they receive little support from LBCs and their PCs who are, under these conditions, not motivated (nor able) to invest in a better position of producers of cocoa. Farmers complained that PCs cheat farmers with wrongly adjusted scales and buy inferior beans (FS 2003, FS 2005).

When looking at the effects of marketing reforms on the quality performance in Ghana, it appears there are both negative and positive effects. The higher producer price made possible by a reduction in marketing costs, gave the incentive for producing higher quantities of premium quality cocoa. Last cocoa season, production reached a record level. The increase in price was not the only reason for this. Smuggling from Côte d'Ivoire, state interventions in the form of mass-spraying and the provision of fertiliser on credit, and the planting of hybrid trees also contributed to the increase in volume of cocoa beans. The pricing system in Ghana has not been reformed, resulting in Ghana being the only cocoa producing country in the region where the price stabilisation system is still in place. In Ghana there is no price-differentiation for varieties in cocoa quality.

On the one hand this resulted in production of a rather uniform high quality; on the other hand, this lack of choice undermined farmers' position as free entrepreneurs and making rational choices. Liberalisation of internal marketing has turned out positively for farmers as they can choose to which buyer they sell their cocoa. Yet, our research shows that introducing competition between buyers provides more opportunities for farmers than are currently utilised. In 2003, more than 65 per cent of the farmers interviewed indicated that they did not receive any help from the LBCs (in 2005 this was almost 88 per cent!). None of the farmers tried to negotiate with buying companies in selling their produce collectively or negotiating for extra services as a group (FS 2005). For the quality performance, marketing reforms are not favourable, as buyers (being in competition with each other) are more prepared to buy inferior cocoa. The lack of incentives for buyers to be stricter on quality control is directly linked to the fact that LBCs (and their PCs) can only compete on volume and are restricted by Cocobod in terms of exporting cocoa.

3.2. Gradual institutional reforms

Apart from marketing and pricing reforms, liberalisation also involved some institutional reforms which affected quality performance. Although QCD has remained the main institute that determines quality performance and is still responsible for two quality checks of the cocoa beans, changes have occurred in earlier stages of production. One of the most important conditions for good quality performance is knowledge of good farm practices and drying- and fermentation techniques. Although most farmers receive this know-how from their families (FS 2005), extension services play an important role in providing new knowledge and technologies (for example on how to tackle the problem of the purple bean disease). In 1999, in Ghana the extension services, provided by Cocobod through its CSD, were merged with those of the MoFA. The objective of the mergers was to provide a more cost effective agricultural extension service to farmers. The idea was that since most cocoa farmers also cultivate other crops (and some keep livestock), they should be considered 'general farmers'. This unified extension system has received a lot of criticism and is currently being reviewed by the government (www.cocobod.gh; see also Amezah, 2004). The current weak extension services affect their ability to remain good quality performance and to anticipate to changes in the (world) market.

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Poor extension services have resulted in experiments of the NGO Conservation International (CI), in cooperation with CRIG, MoFA and the LBC Kuapa Kokoo, with farmer-based extension in the Central region. CI initiated Farmer Field Schools (FFS) which propagate a 'learning by doing' approach and dissemination by farmers of knowledge to their neighbours and association members (CI-Ghana, undated: 5). Within FFS specific attention is given to environmental and social aspects of cocoa production, such as integrated pest management, agro-forestry and child labour. Recently, the STCP has followed up the work initiated by CI and started a pilot with FFS in the Ashanti region (a follow-up by CI is planned in the Western region). Farmers that participated in the FFS are in general satisfied with the received support, although some have them have difficulty applying the new knowledge due to a lack of resources.

The private sector has also become involved in extension services. Wienco for example, one of the major input providers, is active in educating farmers on the effective use of inputs and the importance of good farm practices. Although their main objective is to sell chemicals to farmers, they train farmers on general farm practices and efficient pest management. Wienco has managed to reach a considerable number of farmers and to establish a relation of trust with them (FS 2005).

However, these new initiatives cannot reach all the farmers. A general problem with the way extension services are currently organised is that they lack coordination and alternative services, such as provided by CI, STCP and Wienco, are very costly. Another problem is that the dispersed provision of extension services by a variety of actors confuses farmers. In interviews and group discussions farmers expressed their uncertainty and argued that they are no longer sure how many days fermentation and drying of their beans should take place. They claim to follow advice, but still their beans are being rejected (FS 2005). This is why the farmers themselves are demanding research on real causes of the purple bean disease. There is a debate whether QCD, which position so far has remained intact, is able to deal with control of the increased volume of cocoa beans. The failure of QCD to intercept the inferior purple beans harmed the reputation of Ghana's quality control system. At the same time, questions are being raised about the lack of transparency of the distribution of costs and benefits of the current quality control system.

Farmers' quality performance has also been affected by the increase in production costs and lack of access to credit. This is partly related to privatisation of the distribution of chemicals (used to combat pests and diseases). Prior to the reforms, inputs were generally free or heavily subsidised, and used on a small scale. Increasing prices of inputs harmed cocoa farmers, because it coincided with a period in which the need for inputs increased. In most countries, including Ghana, the frontier of fertile virgin forests had almost been reached. The only way of increasing the volume of cocoa was through intensification of cocoa production, rehabilitating old cocoa farms and planting hybrid trees. These processes require more inputs and labour (Laven, 2005a). The lack of suitable land, and lack of future prospects for young people in the 'cocoa

business,' resulted in their migration elsewhere (CocoaForum, 2004; De Jong and Harts-Broekhuis, 1999). Scarcity of both land and labour has increased the costs of these production factors. It is argued that this has led to 'self-exploitation' among farmers, which means, they need to work longer hours themselves, mobilise family members, and increase labour exchange groups. Due to these more pedological changes it seems that farmers increasingly need support and access to credit. However, support has become fragmented and access to formal credit arrangements is almost absent (FS 2005).

It has been argued by policy makers abroad as well as inside Ghana that some of the problems that farmers face might have been overcome if farmers were better organised. Liberalisation, however, has not gone hand in hand with institutional reforms that could have enabled the farmer to set up his or her own buying company and participate as a real entrepreneur in the chain. According to Tiffen (undated) 'the concepts underpinning the liberalisation process ignored the institutional framework in Ghana and the severely disadvantaged position of farmers which made them vulnerable and therefore likely 'losers' in the process. From the institutional perspective small-scale farmers appear to have been invisible to the designers and implementers of Structural Adjustment Programmes in Ghana.' Tiffen rightly poses the question why 'in the vacuum created by the abolition of the state marketing boards, [...] weren't new forms of institution, for example farmers co-operatives, considered, given the context of a rural-based activity like commodity crop production?'

In Ghana only one cocoa farmer union is currently operational, the Kuapa Kokoo Union (KKU), established in 1993 with approximately 45,000 farmer members. KKU is recognised as a major cooperative although it is not officially registered as such. It produces a small part of its cocoa for the fair trade market. Although there is agreement about the positive achievements of KKU (Mayoux, undated; Tiffen, undated), it has to be recognised that KKU represents only a small proportion of cocoa farmers. Its local cocoa-buying societies depend largely on the benevolence of the PC that buys the cocoa. In principle KKU is supposed to be owned and controlled by farmers. Not all farmers that sell (part) of their cocoa to KKU are aware of its semi-cooperative status (FS 2003), so whether this really is the case remains a question.

Fieldwork in Ghana indicated that most farmers recognise the benefits of cooperation. However, 44 per cent of the farmers interviewed in 2003 (FS 2003) stated that they did not work together in any way³⁹. Farmers that did work together mainly did this on an informal basis to share labour and knowledge. Farmers argued that a lack of formal farmer organisation in Ghana was mainly due to the absence of cooperatives, a lack of trust and consensus among farmers, but also a lack of incentives, financial support and advice. They stress that others should facilitate a process of more formal organisation and support them with expertise and money. So far, little has been achieved in Ghana.

³⁹ For the season 2003/2004 this was 35% (FS 2005).

Earlier I mentioned that in other countries, cocoa coming from farmer cooperatives is generally of better quality.

When linking the institutional reforms to quality performance in Ghana there seems to be a negative correlation between reforms and product quality. The fragmentation of extension services has confused farmers on how to produce the specific product attributes of premium quality cocoa. In Ghana, the absence of formal farmer groups makes it more difficult to reach the widely dispersed farmer community. One would expect that farmer organisation would contribute to more effective extension services and with that to better quality cocoa. The privatisation of the distribution of input resulted in an increase in production costs. This, together with scarcity of labour and a lack of credit facilities, made it tempting for farmers to be less strict on drying and fermentation of cocoa and sell inferior cocoa. This option for buyers to reduce time and energy devoted to cocoa production is, as I described above, one of the consequences of the introduction of competition among buyers.

In terms of process attributes the institutional reforms have opened some new possibilities. The entrance of international private and civil actors in the provision of extension services has introduced (some) farmers to changes in demand and the increasing attention for the environmental and social conditions under which cocoa production is taking place. This development is important as QCD and Cocobod have neglected (so far) the wider criteria for good quality performance, which determine, besides product criteria, (future) access to export markets.

4. Conclusion

Quality performance in Ghana, and the conditions under which the production of cocoa quality takes place, is more directly affected by the way the local cocoa sector is being organised and the reforms that have taken place than by the overall increased 'international-trader driven-ness' of the chain. However, shifts in global chain governance cannot be seen separately from the current way the local chain is coordinated. The convergence of interests of the cocoa industry and Cocobod in the production of high quantities of premium quality cocoa has reinforced local governance structures in Ghana and contributed to a rather restrictive regime for local cocoa buyers and producers of cocoa. The current governance regime fails to provide local key players in the chain with the appropriate opportunities and incentives to (continue) devoting energy to good quality performance. On the other hand, involvement of multinationals in supply chain management introduced alternative extension services for farmers and new technologies and knowledge regarding more environmentally-friendly and socially-responsibly farm practices. In this way the increased control of multinational buyers over the global cocoa chain can be seen as a way of supporting Ghanaian cocoa farmers to remain competitive on the world market, meeting (future) international production standards. However, partly due to a lack of organisation amongst farmers, only few farmers have benefited from these

public-private initiatives. Although we have seen that for multinationals it has become strategic to form alliances with (organised) cocoa producers and intensify cooperation, opportunities resulting from this have been mitigated by local governance structures. With Cocobod as main coordinator of the local production chain, international buyers have difficulties in establishing direct (marketing) relations with cocoa producers.

It can be concluded that in analysis of commodity chain production and upgrading, not only international factors have to be taken into consideration. It is clear from this study that local institutions, reforms and the extent of organisation among farmers are important factors to be analysed in order to be able to fully assess the impact of changes in the chain as a whole, and to understand how vertical and local networks interact. A problem with the current situation in Ghana is not so much the risk of exclusion of farmers, but far more the deteriorating conditions under which farmers are included in global value chains. The costs and risks involved in production of premium quality cocoa have become high, while the benefits have decreased, especially for farmers.

For the time being, most farmers consider production of premium quality cocoa still as their responsibility in guaranteeing the future demand for their product. However, farmers feel more and more under-appreciated for their contribution to the Ghanaian economy and emphasise that they deserve more support and want more transparency on how the costs and benefits—linked to the production of premium cocoa—are distributed among the different stakeholders. Without new incentives it is likely that the quality control system in Ghana ultimately collapses. If Cocobod and/or international traders would like to avoid this scenario they have to find ways to regain farmers' trust and their interest in dedicating resources, time and energy to good quality performance.

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Standards and market access in Indian cashew processing and international trade

Nienke Tander and Aad van Tilburg

Abstract

Literature indicates that standards are becoming increasingly strict, hampering market access for those actors who cannot meet these demands. This line of reasoning assumes that only actors who can successfully meet these standards will maintain market access. Research on cashew processing and trade in and between Kerala (India) and the Netherlands, however, shows a different pattern. It is precisely the reliable and quality aware processors and shippers of cashew kernels, i.e. those who ‘successfully’ implement standards, who face difficulties in remaining capable to access markets. Our case study shows that standards are malleable and differentially put into practice by the various actors involved. Focusing on the way in which standards continue to be put into practice, rather than focusing merely on the moment when standards were introduced or tightened, allows us to question ‘mechanical’ accounts of impacts and effect drafted in terms of market ‘exclusion’ or ‘inclusion’. Instead it makes it possible to conceptualise standards as ‘malleable’ entities that become differentially entangled with actors, objects and processes. ‘Success’ or ‘failure’ in implementing standards does not, therefore, automatically lead to inclusion in or exclusion from global commodity chains. Rather, as we argue, standards—and their malleability—become additional tools at the disposal of actors engaged in economic transaction where uncertainty is an overriding factor.

1. Introduction

Standards play an important role in the regulation of food production and trade. They can facilitate production and trade (see for example Kohls and Uhl, 1998: 294–311) and improve access to markets by, for example, creating a framework that facilitates communication between different actors. In this sense they function more or less as a common language indicating the possibilities and limitations in production and trade. When products and processes become more standardised transparency increases, making trade more predictable and easier to control, reducing the costs involved in economic transactions (Williamson, 1975; see also Busch, 2000).

However, standards can—intentionally or unintentionally—hamper market access for those actors who are unable to meet them (see for example Dunn, 2005; Reardon *et al.*, 2001; Wilson and Otsuki, 2001; Dolan and Humphrey, 2000). This is particularly relevant as an extensive body of literature indicates that both public and private

standards are becoming increasingly stringent (see for example Busch and Bain, 2004; Barrientos *et al.*, 2003 with regard to codes of conduct; Henson and Caswell, 1999 with regard to food safety issues; Reardon, 2006 with regard to the role of supermarkets in developing countries; World Bank, 2005). Standards can be introduced or adjusted as strategic tools to ensure, for example, market penetration, system coordination and quality and safety assurance (see Reardon *et al.*, 2001). Quality and safety standards in particular have been tightened considerably as a result of recent European food scares. For example, the General Food Law (EC no. 178/2002, effective in 2005) requires improved hygiene and traceability throughout the entire food chain, placing more responsibility for food safety on the actors involved in these chains. To prevent food safety problems to arise and to avoid claims and damage to the reputation of downstream actors like large supermarket chains and manufacturers, more control over the entire chain is desired by these actors. They realise this, for example, through setting stricter standards and demanding improved traceability. Advances in quality testing and detection techniques have contributed to the setting of increasingly stringent standards too. Recently, also the need for environmentally friendly practices and improvements in the social conditions of those involved in production has received increasing attention. In some cases these different standards are intentionally used as non-tariff trade barriers (see for example Henson and Loader, 2001; Athukorala and Jayasuriya, 2003), for example to protect local industries. Taken together, such changes can lead to sets of standards that are stricter than those required by law (Busch and Bain, 2004). Whether or not this is intentional or unintentional, it does lead to the creation of market barriers and reduced market access. Busch was among the first to address the ethical issues relating to standards. He points out that a standard that describes a good product by implication also defines what constitutes good procedures and who are good producers (see Busch and Tanaka, 1996). Ultimately, standards affect who produces what, how and when (Busch, 2000).

From the field study on the cashew chain⁴⁰ between Kerala and the Netherlands⁴¹ (see Figure 1) it became clear that many different standards play a role. These standards can be divided into several different categories including product quality (including standards for colour, form and size), food safety (including standards for microbiological pathogens and pesticide residues), environmental standards (including standards for packing material and organic production) and social standards (including standards for child labour and labour conditions).

Different actors involved in the chain display various strategies and practices with respect to standards. In Kerala, there are a few processing companies that can be classed as belonging to the 'leading edge' among cashew processors as far as the introduction of quality systems are concerned. They might even be considered as

⁴⁰ 'Chain' can be considered as a heuristic device: each actor in the chain is embedded in networks of relationships that (may) influence his/her actions in the chain.

⁴¹ Although the field research has been limited to Kerala and the Netherlands, practices described also refer to other EU and USA actors.

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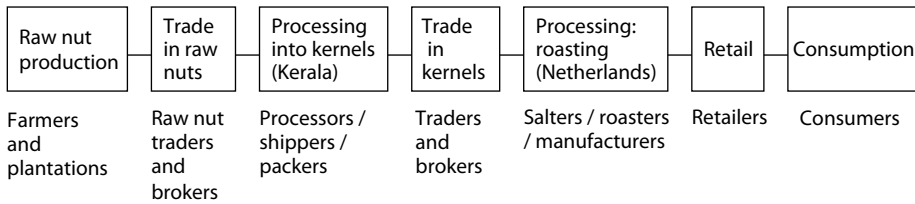


Figure 1. Cashew chain from Kerala to The Netherlands.

belonging to the ‘bleeding edge’—the category preceding the leading edge and the one where greater risks are taken. By introducing new and often costly technology such as related to the introduction of HACCP⁴² systems, like for example tracking and tracing technology, such shippers may have a first-mover advantage: they have been the first to introduce something new (see Porter and Van der Linde (1995) in Loader and Hobbs (1999: 691). However, this could turn into a first-mover disadvantage as it is not entirely certain which direction the market will take and if the innovation is generally adopted, other companies benefit from cost reductions as this innovation is further developed and more widely implemented. Given that quality standards are becoming increasingly stringent and more attention is being given to food safety and traceability, taking steps to ensure quality does not at first glance seem to involve much risk. However, as this chapter shows, such measures do not guarantee market access.

We focus here on the practices of processors / shippers in Kerala and the buyers (mainly traders/brokers and salters) in the Netherlands, the European Union and the USA. In particular we explore the way they implement standards and reflect on the implications of these practices from the perspective of quality shippers in Kerala.

During fieldwork it became clear that there is a considerable discrepancy between the existing literature on standards and market access and developments observed in the cashew chain. Current literature focuses generally on the moment when a standard is introduced or tightened and how the actors involved respond to the new situation (see for example Loader and Hobbs, 1999). As we have mentioned above it is argued that as standards increase in number, complexity and stringency they have a direct impact on market access. Generally, it is assumed that those actors who can meet the standards can continue to access markets and those who fail to do so find their market access hampered.

In this chapter we argue that apart from the focus on the moment of introduction or adjustment of a standard, it is equally important to study the ways in which actors continue to put these standards into practice. Bingen and Busch (2006) show in their book on agricultural standards how actors continue to renegotiate and set standards,

⁴² HACCP: Hazard Analysis Critical Control Points, a process-oriented approach to assuring food safety.

demonstrating that standards are not static, but are continually being adjusted. The process of actors renegotiating standards can effectively be analysed using Convention Theory. Essentially, Convention Theory '[...] offers a framework for examining interactions between actors who manifest an interest in coordinating, if not cooperating, in order to achieve their objectives' (Sylvander and Biencourt, 2006: 99). It focuses on how actors coordinate interests that are based on different frames of reference also called 'conventions', 'worths' or 'worlds'. With regard to quality, for example, 'there is no universal understanding of quality and quality is cognitively evaluated in different ways [by actors] depending on what 'world' is used to justify evaluation and action [...]' (Ponte and Gibbon, 2005: 7). These worlds or conventions of quality '[...] enable actors to coordinate their behaviour. For example, in order to assess the quality of their products, they may draw upon various criteria related to interpersonal relationships (trust and brand-domestic convention), standards (scientific measures, third party certification-industrial convention), or the market (direct assessment of quality, price-market convention)' (Sylvander and Biencourt 2006:99). However, the same actor on the same day and in the same social space may use different frames of reference as a bases for his or her behaviour and to justify his or her actions, as he or she moves from one situation to another (see Boltanski and Thévenot (1999: 369) in Jagd, 2004: 3). Thus, the way an actor applies one and the same standard, and justifies this behaviour, may well vary depending on the situation involved.

However, even though it is important to consider the renegotiation of standards by actors who manifest an interest to coordinate, another aspect also needs to be taken into account: actors continue to put standards into practice in their own interest, i.e. they use and manipulate them to pursue specific ends without any actual adjustment of the (formal) standards themselves⁴³. As this chapter shows, these practices vary, as they depend on the practices of, and relations with, other actors, objects and processes. For this reason, we suggest the concept *malleability* which is particularly useful when analysing the way standards are used. From this perspective we aim to highlight the regulative character and the profound effects of standards. Until now little attention has been given to these aspects in the literature on standards and market access.

To analyse standards as malleable entities, Actor-Network Theory (ANT) provides an interesting dimension to Convention Theory. To analyse the way in which the practices of and relations with actors, objects and processes influence the way standards are put into practice (and *vice versa*), the ANT notions *intermediary* and *mediator*, as defined by Latour (1987, 2005), is a useful entry point (see also Lockie and Kitto, 2000: 14). An intermediary '[...] transports meaning or force without transformation: defining its inputs is enough to define its outputs' (Latour, 2005: 39). Basically, a standard can be considered as such: defined to realise a certain goal such as, for example, reducing transaction costs or improving food safety or quality and the result is expected to be as planned. In this case, a standard is a black box transferred from one actor in the chain to another without being transformed. Mediators provide a different dynamic: '[t]heir

⁴³ This is shortly mentioned in Bingen and Busch (2006: 13), see also Jha (2005: 52) for an example.

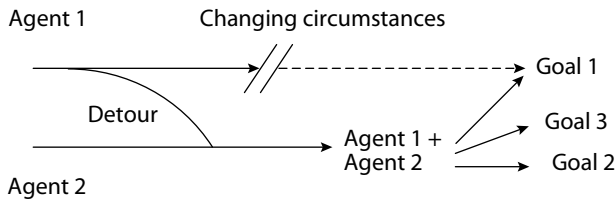


Figure 2. Program(s) of action (Latour, 1999).

input is never a good predictor of their output [...]. Mediators transform, translate, distort, and modify the meaning or the elements they are supposed to carry' (Latour, 2005: 39; see also Latour, 1999: 307).

A standard can be considered an intermediary as long as it is adhered to and is not renegotiated or put into practice in a 'malleable' way, and the outcomes are as planned. Then, they function as a black box. However, changes in certain (market) conditions, including changes in social-cultural, technological, economic and political factors as well as changes in relations with suppliers, customers and competitors can trigger intermediaries to become mediators (and *vice versa*). This means the effect of their behaviour becomes unpredictable. Actors involved in cashew processing and trade operate in a highly uncertain environment, with frequent and wide price fluctuations, changing (food safety) regulations and standards, and face the opportunistic behaviour of other actors, all of which has a profound impact on strategies followed and the way standards are put into practice. Figure 2 (Latour, 1999) shows how changing conditions can affect actors' practices.

Figure 2 shows Agent 1, for example, an Indian cashew processor who supplies a certain buyer (Goal 1⁴⁴). Circumstances change, for example, the buyer introduces or tightens a standard as a result of changing food safety regulations and the relationship is interrupted. The processor has to adjust his strategies (take a detour) if he is to be able to realise his goal. Therefore, he enrolls Agent 2, the new standard, for example through the introduction of a new processing technique. Possibly, more detours are necessary to attain that particular goal. When all is adjusted and functioning smoothly, i.e. the standard does what it was implemented to do, it can be considered an intermediary. There are also examples, as this chapter shows, where standards are not put into practice in the way they were designed. For example, when the cashew price fluctuates, actors may apply standards more strictly, may relax standards, or may pursue other goals (for example supplying to another buyer). Thus practices vary although the formal standard may remain the same. As a result, the networks formed

⁴⁴ Note that objectives can be plural. Prabhu and Pillai (2002: 17) write in their paper for a national seminar on cashew that "What is naturally at the uppermost in the minds of any operator [shipper] is cost and their control or minimisation". But at the same time a shipper might also want to produce cashew of a certain quality, make a living, or maximise margins and so on.

are dynamic and ever changing (see also for example Callon, 1986), providing both opportunities and limitations for undertaking action.

Thus, the malleability of standards is closely related to a number of factors, among which contracts and contract enforcement play an important role. In the cashew trade there are written (forward) contracts. However, the willingness to comply with contract conditions can only be assured if an enforcement mechanism exists that penalises breach of contract (Fafchamps, 2004: 23). There is, of course, a difference between an excusable breach due to events beyond the control of the actor, possibly resulting in contract flexibility including renegotiation of the contract, and a breach of contract due to opportunism such as a lack of willingness to comply with certain terms.

Several mechanisms may prevent a deliberate breach of contracts, for example, recourse to legal institutions and subsequent law suits or relational exchange (or contracting). Relational contracting theory explicitly accounts for the historical and social context in which recurrent contracting takes place. It views the enforcement of obligations as a consequence of the mutuality of interests between a set of parties (Claro, 2004: 29). However, as this chapter makes clear, breach of contract is a frequent occurrence in the cashew trade, but such opportunism is hard to predict. Like Douma and Schreuder write: ‘Williamson does not assume that everybody behaves opportunistically. He assumes only that some people might display opportunistic behaviour and that it is difficult or [sometimes] impossible to distinguish *ex ante* [...] honest people from dishonest people. Even those who behave opportunistically need not do so all the time (Douma and Schreuder, 2002: 148)’.

The following sections analyse the on-going processes in the cashew industry and trade and emphasise the way standards are put into practice, in order to show how this influences access to markets of, in particular, quality aware and reliable shippers. Section Two introduces a quality aware and reliable shipper who indicates that business under present conditions is difficult, even though he does not find it a problem to implement buyers’ standards. He is more or less representative of the category of the (few) reliable and quality aware shippers in Kerala. Section Three discusses some of the general problems faced by processors in Kerala, including government regulations, trade unions, price levels and India’s position on the world market. Section Four describes quality issues and standards and shows how these play a role in cashew processing and trade. Section Five discusses the (un)reliability of both shippers and buyers and contract enforcement. Unreliability is a significant factor in the cashew trade and closely related to the way standards are put into practice. In Section Six the different elements discussed in previous sections are combined and elaborated to analyse the influence on market access. Section Seven contains the conclusions.

2. The case of reliable and quality aware shippers

[Kerala, visit to a cashew processing factory, January 2003]

After I had put on special slippers, an apron, and a hairnet, washed my hands and dipped them in a purple coloured disinfectant (as per the do's and don'ts written in English and Malayalam on a board above the sink) we entered the factory hall. Actually I should have taken my ring off as well, as it contained a stone, but for this time it was enough to turn the stone to the inside of my palm, so that I would not give a wrong example to the women working inside. In the hall I see women sitting at neat rows of tables grading cashew kernels. Over their colourful sarees each wears an apron as well as a hairnet and gloves, *'though they still resist wearing the slippers'* the quality manager tells. The hall is well lit with fluorescent lamps and the walls are painted in bright blue and white. The oppressive humidity of the Kerala noon has stayed more or less outside. The grading of the cashew kernels takes place with amazing speed. What are hardly distinguishable kernels to me is no problem for these women: without hesitation they take the kernels from a heap and put them into the different bowls in front of them. Over 40 different grades are processed here. I am at one of the few factories in Kerala with a HACCP certified packing centre. The rest of the factory is organised according to good manufacturing principles and it is also ISO certified. The quality manager has just proudly told me that since the introduction of HACCP, quality problems have been reduced considerably. Recent tests have shown that the total plate count (test indicating the total amount of bacteria on a sample of cashew kernels) has fallen from 600 when HACCP was first introduced to the present level of 25. When asked to write something in the visitors' book I see that customers have given reasonably positive reactions to the factory. *'If everything has been improved so well, I wonder on my way back home, why did the shipper tell me business was quite difficult at the moment?'*

The above description depicts the grading centre of a factory with a HACCP certified packing unit. It belongs to a company that was established in the 1950s, about 20 years after the first shipments of cashew kernels began. The company consists of a parent firm and a number of other firms which are run by eight brothers. They operate their factories on an individual basis processing raw cashew nuts (RCN) into edible kernels (see Box 1).

Box 1. Cashew processing in Kerala.

1) Drying RCN	2) Roasting / steaming	3) Removal shell	4) Drying and cooling	5) Peeling	6) Grading	7) Packing
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1. For the **drying of the raw cashew nuts**, the raw cashew nuts are placed in the sun in drying yards to facilitate the storage without rapid deterioration.
 2. The **roasting / steaming** of the RCN is done to enable the removal of the hard shell. During roasting the raw nuts pass through a heated drum where they catch fire. This takes about two minutes. Steaming means that the raw nuts are steam cooked.
 3. The method for **removing of the shell** depends on whether the nuts are roasted or steamed. After roasting the shell is manually removed by workers with a wooden mallet. After steaming the shell is semi-mechanically removed by workers placing the nut between two blades operated by a foot pedal. The first method (roasting and shelling) is the most common in Kerala.
 4. During **drying and cooling**, the kernels first go into a kind of oven (borma), after which they are cooled using humidifiers. This facilitates the removal of the peel (testa), but is also said to be important for maintaining the white colour and to prevent breakage during subsequent processing (Nair 2002).
 5. **Peeling**: workers manually remove the testa, and carry out an initial grading of the kernels.
 6. **Grading**: takes place by hand and/or sieve, according to an elaborate grading system.
 7. **Packing**: graded kernels are packed either in tin containers or flexibags and then in corrugated boxes. The whole process takes at least 8 to 10 days.
-

A number of relatives who operate their own factories but belonging to the same 'group' are usually called 'group shippers'⁴⁵. The advantage of this type of organisation is that although each member works independently, they can help each other out if necessary, for example, if a large order comes in. In addition to group shippers there are also the so-called medium and small shippers. As we shall see in Section 5, these shippers do not consist of a group of family members, and buyers and other shippers often consider them unreliable.

Quality plays an important role for a company such as the one described above. One of its objectives as stated in its brochure reads 'to provide maximum satisfaction to

⁴⁵ This form of organisation is generally not found in other processing countries.

the needs of customers by strict conformance to the accepted standards of quality and safety'. This is not only in word, but also in practice. They are ISO 9002 certified, follow the guidelines of good manufacturing practices (GMP), and they were among the first to implement HACCP for a packing centre near Kollam, where cashews from the different factories are assembled and packed under hygienic conditions. This company can be categorised, in fact, as belonging to the 'bleeding edge' of cashew processors in Kerala with regard to the implementation of quality schemes. Various informants associated this company with quality: the chief executive of a quality inspection agency indicated that quality has always played an important role for the company from the very beginning, and informants in the Netherlands explained that this shipper was one of the few reliable and quality aware shippers.

However, despite the investments in quality, the shipper himself makes clear that competition between processing companies is fierce. Established group shippers are in trouble because of the increasing number of processing units. This raises the question of why a shipper known to be reliable and quality aware, with a reputation established over generations, is finding it hard to compete with newly emerging companies? The consequences of competition are clear. The HACCP certified packing centre visited in 2003 and described above appeared to be closed during a visit in 2005. Another group shipper interviewed in 2003, explained that he was reducing his export volume and was even considering leaving the cashew business to invest in another food product. And a Dutch broker, describing the situation of a very reliable and quality aware group shipper, with the most modern factory in Kerala, stated:

[The Netherlands, broker, November 2002]

'He has built a modern factory according to HACCP standards and actually he produced the best quality cashew. However, other shippers made fun of him, because they said he would go broke. Also the shipper himself told me that he had chosen the wrong track, as he could not sell his kernels. He even considered producing a lower quality.'

These are examples of group shippers whose companies have been in business for several generations, who are quality aware, who have been implementing standards as suggested by buyers, and who are considered to be reliable. Still, they face difficulties operating in the contemporary international market where new companies are continually popping up. This apparently contradictory situation can be explained by a number of interrelated features related to cashew processing and trade. First, in Section Three, we describe the business environment in Kerala, prices and its position on the world market. Although this basically affects all shippers, some are more deeply affected than others.

3. Kerala's business environment, prices and position on the world market

The processing industry in Kerala faces a number of difficulties. These are the result of (discouraging) government regulations, the influence of trade unions, low kernel prices and increasing international competition. This section provides examples of how these factors affect the processing industry and its position on the world market.

Although there is some government support for the cashew industry, including loans for processing for export and to implement HACCP schemes, shippers in general consider government regulations to be disadvantageous. In the past, various regulations have had a negative impact on the processing industry. For example, the introduction of minimum wages (1953), basically a positive development for the workers, resulted in the rise of so-called cottage processing: clandestine factories where labour laws are ignored and wages are lower than the stipulated minimum (Lindberg, 2001: 91). Processors started to divert raw nuts to this 'unorganised' sector, which was also housed in registered factories (Kannan, 1978: 8). At present, there are still many factories, both registered and unregistered, where labour laws are ignored and trade unions and inspectors are bribed to ignore these malpractices. Processors also shifted the processing to neighbouring states, like Tamil Nadu, where availability of cheap labour (child labour and no minimum wages) resulted in a cost advantage. At present, many shippers still run factories outside Kerala because of the cost advantage⁴⁶. For example, the production costs in Tamil Nadu are lower by an estimated Rs 500⁴⁷ per bag. A shipper reckoned that a company with four factories in Kerala runs about ten factories in Tamil Nadu. In 2006, the government decided to raise the wages of the cashew workers in Kerala, which may provide again an incentive to shift the processing to neighbouring states, further abandoning the factories in Kerala. The wage raise may also cause a shortage of kernels on the market: even though there is sufficient supply of RCN, shippers will wait with buying RCN (from Tanzania for example) until their costs are in line with the world kernel prices (www.amberwoodtrading.com).

Other examples of disadvantageous government regulations in the past include the government's monopoly over the procurement and allotment of RCN, a regulation implemented several times in the period 1977- 1994 (see Véron, 1999), and the Kerala Cashew Factory Acquisition Act which allows the government to take over factories without any compensation if these do not run for more than 90 days per year, a regulation that was particularly enforced in the 1980s. A group shipper explained that at that time, they refused to buy the RCN allotted to them by the government, as the price was too high in relation to the market price for kernels. As a result shippers closed their factories and the government confiscated them according to the acquisition act. When, after six years of law suits, the shippers were able to re-possess their factories they found them severely neglected.

⁴⁶ Even though in Tamil Nadu minimum wages are said to be more adhered to (but are still much lower than in Kerala) and child labour is said to be less common than in the past.

⁴⁷ Approximately €10,42 (In 2003, €1 ≈ Rs 48).

At present, shippers are not allowed to close factories that have more than 100 employees⁴⁸ without permission from the State Government, even if the company is not functioning well. This has a profound effect on the organisation of the cashew industry, especially as far as the 'unorganised' sector is concerned:

[Kerala, group shipper, May 2003]

'No cashew factory has officially been closed down, but so many have gone bankrupt. The owner still owns the factory, but leases it out to somebody else. This leasing is close to being illegal, the persons who lease do not pay workers a full wage and inspectors are bribed. As a result, these factories are more viable than official companies and they run their factories for more days per year (about 200) than we can. The people who are leasing these factories are often close to the people from the trade unions who use a double standard: one for factories that run officially (very strict) and one for their friends and relatives who lease factories and exploit the workers.'

Many shippers consider trade unions to be a serious impediment, because they are difficult to deal with as there are many of them and they are weak and corrupt. They frequently call strikes, paralysing the entire production process, affecting for example just-in-time delivery (see Section 4) and increasing the chances on problems with quality, for example with regard to infestation. One shipper described how the unions called for a strike when he replaced the wooden mallets to crack the RCN with cutting machines. This meant that workers could do more work, but it also meant, according to the trade unions, less work and thus income for workers in other factories. Many workers disapprove of such strikes too, because they lose a day's income.

Besides the problems resulting from government regulations and trade unions, the kernel price is considered low. Cashew has become one of the cheaper tree nuts, although previously it belonged to the most expensive ones. The supply of both RCN and kernels is high. The number of processors / shippers on the world market is increasing. In India, many traditional cottage processors, who were previously not involved in export, entered the market as small and medium shippers when the government liberalised the export in the 1990s. Since, everyone with a purchase order is allowed to open a bank account and get credit to purchase, process and export the goods. However, the demand for kernels lags behind the supply, affecting the price levels. Furthermore, according to a group shipper, prices have also been pushed down by buyers who are making use of the price difference between the cheaper processors and the 'quality' processors. This has seriously affected the margins in the cashew sector. If prices continue to decline, it may become more attractive for shippers to sell kernels on the domestic market rather than export them.

⁴⁸ There are thoughts to raise this number to a number of 1,000 workers.

The margins of shippers are further reduced when the price for RCN is not adjusted to the low kernel price. This puts shippers in a price squeeze (see Box 2). Usually raw nut and kernel prices are linked: when the price for kernels rises, the price for raw nuts follows. There is less price elasticity, however, when the price of kernels falls as farmers and traders would lose the incentive to be involved in production and trade. However, for example in 2006, the price for the raw nuts remained exceptionally high despite high availability and declining kernel prices. This was due to speculative trade strategies being employed by international raw nut traders. They were able to store the nuts and dictate prices, at least until the next harvest season came around. Under such circumstances some processors may be forced to (temporally) close their factories.

Box 2. Cashew prices continue to decline.

28th February 2006: Cashew prices continue to decline. From the small Indian packers we have seen offers as low as US\$ 1.80 per lb FOB* and even the Indian group packers are selling at levels of US\$ 1.90 per lb FOB for shipments on short term. It is expected that some shippers will close their doors, temporarily perhaps, as long as it proves impossible to buy raw seeds at par with current kernel prices (www.Amberwoodtrading.com/News/cashews.aspx).

* FOB: 'Free On Board': the seller delivers the goods when these pass the rail of the ship in the agreed harbour of shipment (ICC, 2000: 67). This can be the port of origin or destination. From this point onwards the buyer is responsible for the risks and costs of loss of and damage to the goods.

In general, this means that the factories in Kerala will be the first to close because shippers will turn to lower cost factories in Tamil Nadu. They will only operate factories in Kerala when they have an excess of raw nuts. Producing in Tamil Nadu or combining production in Tamil Nadu and Kerala gives a price advantage that enables shippers to be more competitive on the world market. Outsourcing processing to cheaper cottage processors (then called commission units), also occurs and can also yield cost advantages. However, despite the price advantage that is created by running factories in Tamil Nadu and / or outsourcing, the position of India on the world cashew market appears to deteriorate. In the 1990s, Vietnam made a spectacular market entry replacing Brazil in second place. Currently Vietnam produces kernels of similar or—according to some informants—slightly better quality in terms of colour and moisture. They also tend to be a bit cheaper.

These developments affect the viability of the cashew processing industry in Kerala. In addition, shippers, and quality aware shippers in particular, have to deal with the increasingly stringent quality standards outlined below.

Table 1. Categories of standards.

Categories of standards	Examples with regard to cashew
Product characteristics	Grades: colour (e.g. white or scorched); count ¹ (size); form (whole or broken / split). Presence of foreign matter (stones, metal particles, hairs); infestation (dead or live bugs); spotting (dark brown spots appearing after roasting); adhering testa (peel); scraping (damage possibly caused by removing testa with a knife), etc.
Food safety	Microbiological pathogens (e.g. e-coli, salmonella); pesticide residues or banned pesticides (BHC, methyl bromide); HACCP
Environment	Environmentally friendly packaging, organically produced cashew
Social	Ethical trade: labour conditions, child labour

¹Count: number of kernels fitting into one pound (454 grams), generally judged based on size.

4. Quality issues and standards

Many standards apply to cashew kernels and these can be classified as follows: product characteristics, food safety, environment and social issues (see Table 1). Quality testing occurs in India in the form of pre-shipment testing in a laboratory appointed by the shipper and possibly an additional laboratory appointed by the buyer and, after arrival, again the load is tested.

Some standards are particularly stringent. These include the specifications (private standards) from quality aware buyers, and demands regarding food safety. In addition, just-in-time delivery⁴⁹ has also become very important. Most (quality) shippers claim that these increasingly stringent demands are not too difficult to deal with. Frequent visits by buyers who make suggestions about possible improvements can lead to a gradual improvement in the capacity of the factories concerned. However, the implementation of new standards, resulting for example in the obligation to wear hairnets and special slippers, is often met with worker resistance and sometimes ends in strikes. However, not only buyers are responsible for increasingly strict standards. The cashew industry is involved as well:

[Kerala, group shipper, April 2003]

'Increasingly stringent quality demands have been started by the Indian processing factories themselves. The number of processing factories in India has increased drastically, from 300 to 1600 in about 15 years. The increased demand for the raw cashew nuts caused the price to rise, which put the processors under pressure. The demand for kernels was growing as well, but not as much as the supply. Selling the kernels for a higher

⁴⁹ Delivery of the load at the moment the buyer needs it, reducing the storage costs of the buyer.

price to keep margins acceptable was not a solution. If the price rises too much, customers will substitute cashews with almonds. Thus, what Indian shippers started to do was offer better quality to keep a market share. Since that time customers are aware of the possibilities and have started to ask for better quality⁷.

The group shipper introduced in Section 2 chose quality as a way of dealing with growing competition. Below is a brief overview of a number of standards based on the categories mentioned above.

4.1. Product characteristics

Factories can produce over forty different grades of cashew nuts, of which twenty six grades are commonly exported. These grades are described in grade charts of for example the CEPC⁵⁰ and AFI⁵¹. Table 2 shows the CEPC specification for the grade W320, a whole white kernel with a count 320. The specification shows the required characteristics of the kernels, plus the allowed variation, such as the percentage of broken kernels and lower grades. Dutch buyers generally purchase three specific grades, namely W320, W450 and W240. Besides that the grades indicate what shippers can supply, they also form the minimum requirements of buyers. Shippers can exercise considerable control over the quality (or purity) of the grade, provided that labour conditions and the skills of the labour force are good.

In general, many Dutch and Indian informants indicated that there are not many problems related to the product characteristics of the kernels. Issues mentioned by buyers are for example spotting (dark brown spots that appear on the kernel but only after roasting), infestation (dead or live bugs), scrapings and splits, as well as the presence of foreign matter (such as glass) which is also a problem with regard to food safety. The specifications in the grade charts have not changed much. However, the private standards of some buyers have become more stringent while other buyers apply them more loosely.

4.2. Food safety

Cashew (roasted) is generally considered a low risk food product. Aflatoxin, a toxic substance produced by a specific mould that frequently occurs on nuts such as pistachios, does occur in cashew but does not exceed the tolerance limits. Microbiological pathogens, such as *E. coli*, *Salmonella* and *Staphylococcus aureus*, possibly introduced during processing are destroyed during roasting⁵². Furthermore, awareness about pesticide residues is growing, but it is not considered a major issue

⁵⁰ CEPC: Cashew Export Promotion Council in Kerala (www.cashewindia.org).

⁵¹ AFI: Association of Food Industries in New Jersey, USA, for trade with the USA (www.aftmytradeassociation.org).

⁵² It can be problematic when the kernels are consumed unroasted.

Standards and market access in Indian cashew processing and international trade

Table 2. Cashel kernel W320 characteristics (Grade chart of the Cashew Export Promotion Council India (CEPC)). Source: www.cashewindia.org.

Grade designation	Trade name	Colour / characteristics	Count/454 gms size description	Max. moisture %	Max broken %	Max NLSG* NLG** %
W-320	White Wholes	White / pale ivory / light ash. Characteristic shape	300 – 320	5	5	5 (NLSG and SW*** together)

Remarks: kernels shall be completely free from infestation, insect damage, mould, rancidity, adhering testa and objectionable extraneous matter. Scraped and partially shrivelled kernels also permitted provided such scraping/shrivelling does not affect the characteristic shape of the kernel.

* Next lower size grade (W450); ** Next lower grade (SW320); *** Scorched whole

for cashew⁵³. However, the presence of foreign materials like glass and metal particles is a matter of concern.

In spite of the low risk, certain processors and buyers claim they appreciate hygienic working conditions. Cashews are, after all, intended for human consumption. Therefore, general standards related to food safety are becoming increasingly stringent. Quality aware buyers frequently visit shippers' factories and make suggestions about how they can be improved. This has led to a growing number of companies applying for ISO and HACCP certification. HACCP is a process-oriented approach to assure food safety. It includes identifying where hazards are likely to occur, the critical control points for the hazards, the preventive measures to be taken, the establishment of monitoring procedures, the response to violations of critical limits, record keeping, and continued validation and updating of the system (Caswell and Hooker, 1996). The government is providing loans to support the implementation of HACCP.

4.3. Environmental standards

Some environmental standards exist: packing material has been changed from tin cans to more eco-friendly and recyclable material and slowly networks for sourcing organic cashew are emerging.

4.4. Social standards

Social issues are a matter of concern. Child labour, however, is said to be uncommon in Kerala. But there is no guarantee that children will not be found at work if an

⁵³ However, occasionally problems arise, e.g. as was the case with the use of methyl bromide.

unexpected visit is paid. In many factories, women do not receive the minimum wages, bonuses, they are cheated, and work in poor conditions:

[Kerala, visit to a factory of a (small) shipper, February 2003]

We enter the cracking unit. It takes a little while for my eyes to adjust to the darkness. The unmistakable smell of roasted raw nuts prickles my nostrils. Finally, when my eyes are more or less adjusted to the darkness inside, I am able to distinguish numerous women sitting on the floor. They are surrounded by blackened cashews, straw baskets, tins and empty shells. It all looks black and dirty. One woman shows how she cracks the shell: a raw nut is put on a stone and by hitting it with a mallet on four specific spots she can crack the shell but keep the kernel undamaged. This is important, as she will only get paid for whole kernels. It is warm inside and dark. One wall made of wood with large cracks between the planks provides a little light and a little bit of fresh air. It also allows pigeons and bugs to move freely in and out. We leave and outside the air I previously found so oppressive and humid is now a welcome relief.

Social issues are receiving more attention, but enforcement is weak. It is often difficult to get a clear insight into labour conditions as shippers usually operate multiple factories including factories in other states. Buyers come with ethical trade questionnaires to keep track of social issues but many shippers do not tell the truth and double bookkeeping is not uncommon. In practice little action is taken.

Enforcing standards and other agreements set out in written contracts requires the functioning of enforcement mechanisms. The following section deals with this aspect and analyses contract enforcement and the reliability of the actors involved.

5. Reliability and contract enforcement

[The Netherlands, broker, January 2006]

'It starts with the raw cashew nuts and continues with the cashew kernels. In the trade with both commodities there are buyers who let down their suppliers when the market price falls, and suppliers who let down their buyers when the market price rises. And this shows that in fact the whole (cashew) business is a sick business.'

Trade takes place either directly between shippers and buyers (like traders and salters) or via a broker⁵⁴, and is based on written (forward) contracts. However, breach of contracts, both by shippers and buyers is a feature of the cashew trade. Such unreliability manifests itself, as indicated in the quote above, particularly when prices start to fluctuate and this occurs quite often (see Figure 3). Price levels depend

⁵⁴ For cashew there is no futures exchange, like for example the Chicago Board of Trade.

Standards and market access in Indian cashew processing and international trade

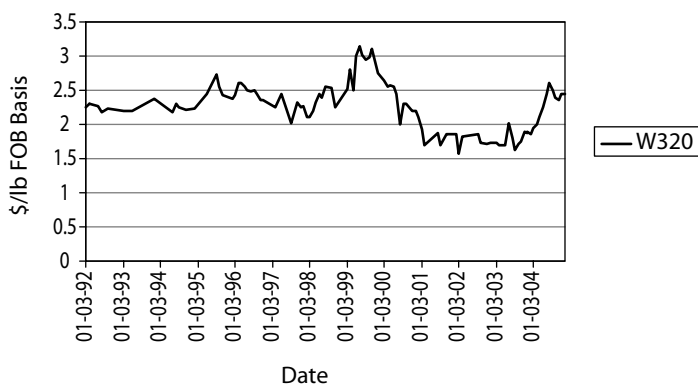


Figure 3. Prices for cashew grade W320 in 1992-2004.

on supply and demand of RCN and kernels, but are profoundly affected by speculative trade strategies based on perceived developments in supply and demand.

5.1. Shippers and (un)reliability

The majority of the shippers are considered unreliable by buyers and this generally manifests itself when kernel price rises. It is then that unreliable shippers default and fail to deliver according to contract conditions. They sell their load on the market to whoever is willing to pay the highest price, leading to even higher market prices, and they possibly, although not necessarily, deliver substandard quality kernels to the original buyer. These defaulters, as they are called, make a lot of money, but buyers are left with a problem. They too have contracts that they have to observe and either they fail to deliver and face law suits, claims and a loss of reputation or they have to buy products of uncertain quality from the market for a higher price. Either way they stand to make a considerable loss.

Defaulters are usually found among the medium and small shippers⁵⁵, and not among the group shippers. The distinction between group, medium and small refers to (perceived) reliability, and does not refer to size as it seems to suggest. The enterprise of a medium shipper, for example, can sometimes be larger than that of a group shipper. Reliability refers to delivery, as described above, as well as to quality. Also with regard to quality, group shippers are generally considered to be more reliable. While medium shippers may deliver cashews of sufficient quality there is no guarantee that this quality will be maintained and fluctuations are common. Small shippers rank high on the list of defaulters and those who deliver poor and unreliable quality products.

⁵⁵ Note that also traders can default on their buyers: for example the traders who lack financial liquidity are unable to deal with a price rise at the moment they have to buy kernels.

However, this distinction between group, medium and small is not entirely satisfactory. A group shipper explained that it was perhaps more accurate to distinguish between ‘good’ (‘quality’) and ‘bad’ shippers, as there are also some–‘not many, but they exist’–reliable, quality-aware medium shippers. In addition, buyers do not consider all group shippers to be equally reliable and quality aware. For example, a Dutch trader once received scorched wholes (slightly darkened kernels due to over-roasting; see 2 in Box 1) instead of white wholes from a group shipper when the kernel price rose. And a salter excluded a group shipper after an audit because his factories were in such a poor condition. Table 3 more or less reflects the distinction between the different categories of shippers and their reliability.

It is important to emphasise that a buyer’s perception and experience plays an important role in determining who is classified as (un)reliable:

[The Netherlands, broker, February 2006]

‘What is an unreliable shipper for the one buyer, is not necessarily so for another. Also, defaulters know how to play the game. They spread the shipments in such way that each time they default on different buyers, so that everybody continues doing business with them.’

Thus, a combination of factors determines the reliability of shippers including the category the company belongs to, price movements, the relationship between the actors involved and the ‘play of the game’. However, not all informants put all the blame for defaulting on a contract on the shoulders of the shippers. The contract flexibility of the buyer, including his or her willingness to set a new price or to place a new order, and whether they are interested to continue the relationship also plays a role, especially if contracts have been made when prices were low. Some shippers had contracts for periods of 1.5 years, set when the price was low, even though they have no idea about the availability and price of the RCN and kernels during the time covered by the contract. However, buyers do not draw up long forward contracts with shippers they consider unreliable because there is a considerable chance of default. They prefer to make short-term contracts of one or more months.

Table 3. Reliability of cashew kernel shippers.

Category	Reliability		
	Low	Medium	High
Small shipper	X		
Medium shipper		X	x
Group shipper		x	X

5.2. Buyers and (un)reliability

The degree of (un)reliability also varies from buyer to buyer. Unreliability of buyers manifest itself when the price for kernels drops in relation to the price set in the contract. For example with regard to the quality testing: both buyer and supplier are aware of the quality of the kernels because of pre-shipment test(s). But even when a load is approved by a laboratory, problems with quality can occur, leading to quality complaints. However, quality complaints occur more frequently when the kernel price drops in relation to the price set in the contract:

[Kerala, group shipper, January 2005]

‘When the price goes up, there are no quality claims. But when the price goes down, there are many claims. Once, a buyer from the U.S. complained about three containers, he said they were infested. I wanted to solve the problem and had sent an inspector to check the containers. But the buyer said that the containers had already been sent for freezing [method to kill the infestation] and that the bugs would be dead already. “Doesn’t matter” I said “I can still count the dead bugs. So let me count the dead bugs”. But then the buyer said the load had already been sent to their customers. It was not possible to check the complaint anymore. All these excuses proved to me that there was nothing wrong with the load, but that the buyer was only trying to get a reduction on the payment.’

When the market price drops in relation to the price set in the contract, these buyers want to make up for the price difference. Some buyers default: they just not open a letter of credit⁵⁶ or reject the load. A more common strategy—once the load has arrived—is to apply standards very strictly or even to make up complaints like the one quoted in the case above about infestation. Grade descriptions (Table 2), even though they are rather detailed, may leave much room for interpretation too. For example, ‘completely free’ is in practice translated into practically free, but it is not quantified. And when exactly is the characteristic shape of the kernel too much affected by shrivelling and/or scraping? When the quality of the cashew nuts is called into question, claims are filed and steps are taken to renegotiate the price and get a discount. Even spelling mistakes in a letter of credit have been used to claim reductions.

However, like is the case with the (un)reliability of the shippers, such strategies do seem to depend on the relationship between buyer-supplier too. If the parties involved want to continue their relationship, defaults and complaints are less likely to occur. It also seems to depend on the possibility to (falsely) complain: a shipper with a HACCP certified packing centre explained that he did not get many complaints when the price drops. There are fewer opportunities to make false complaints as they keep a sharp eye on the quality of the product by monitoring and performing tests, and they started to

⁵⁶ Letter of credit (L/C): a payment obligation: the importing party requests its bank to open a credit in favour of the exporter.

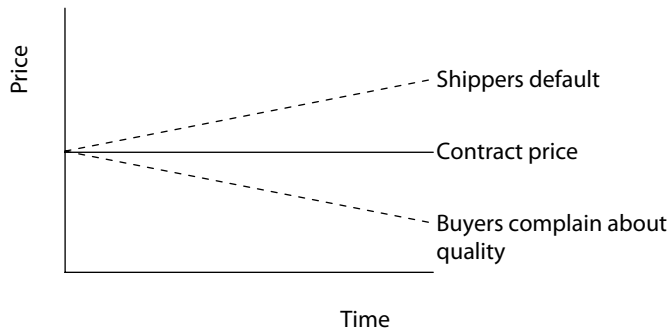


Figure 4. Strategies of shippers and buyers in relation to price fluctuations.

ask for proof when a quality complaint is lodged. Figure 4 summarises the strategies of shippers and buyers in relation to a change in price.

One may wonder why contracts are not enforced. It may be part of the play of the game (like depicted in Figure 4), and although sometimes contracts are enforced, generally it is considered difficult and outcomes are uncertain.

5.3. Contract enforcement

Trade associations, like CENTA⁵⁷ and AFI, have set standard arbitration clauses which are included in the contracts. These set out the obligations of both parties and the terms of arbitration in case disputes arise. However, contract enforcement is seen as difficult and it is not certain whether the benefits of enforcement outweigh the costs, either for shippers or buyers. It is also difficult to enforce penalties if a case is proven. There is, however, a blacklist although it is questionable whether it is used by buyers as a guideline. According to Harilal *et al.* (2006: 21), importers in the UK do not want to enforce any blacklist of suppliers because of current high levels of demand. As will become clear in Section 6, buyers do continue buying from unreliable shippers, but apparently for other reasons than high demand. The different elements discussed so far are connected and elaborated and we analyse the on-going processes in terms of practices and (malleable) standards in order to illustrate the market access of, in particular, the quality aware and reliable shippers.

6. Standards, practices and market access

⁵⁷ CENTA: the Combined Edible Nut Trade Association in London (for trade with Europe), which advises and informs its members and provides them with 'full protection through arbitration and appeal procedures for any disputes which may arise during the course of their trading activities.'

Extending the line of reasoning suggested by the literature on standards and market access, it would be logical to assume that reliable and quality aware shippers are the ones included in trade networks, while the others are excluded because of their unreliability, malpractices and the inconsistent and poor quality of the products they supply. However, in practice this is not entirely the case. Reliable and quality aware shippers, in fact, experience serious difficulties in maintaining their position on the market. The problems for the processing industry can partly be explained by the price squeeze and the adverse business climate in Kerala (Section 3) but, in addition to this, the malleability of standards also plays an important role. In previous sections, some examples of malleability have already been brought to the fore such as, for example, the way standards are put into practice given factors such as price fluctuations and buyer-supplier relationships (Section 5). In this section, the malleability of standards and the way this affects quality shippers is further discussed.

As we have seen, quality aware and reliable shippers claim they do not have serious problems in meeting buyers' standards, but they do expect a higher price for better quality in return. For example, implementing ISO and HACCP means that production costs increase, not only because investments have to be made to improve factory conditions, but workers also have to be trained and quality systems maintained. Some buyers, of course, do appreciate quality and are willing to pay a little more, but many shippers do not receive a premium price for their premium quality and often even the cost difference is not covered. Buyers are also prepared to buy from other shippers who have not implemented stringent standards:

[Kerala, group shipper, May 2003]

'European buyers come to my factory and say what has to be changed. They told me to implement ISO and so on. So I did. But what I noted is that the buyers come and tell me what to do, but back in their own country they do not seem to care from who they buy. Then, only price matters. They also buy from factories that do not implement improvements. Therefore, I decided not to make any further investments in my factories than what I consider to be necessary.'

The shippers who have not made improvements can be group shippers as well as defaulters. In fact, buyers seem to buy increasingly from defaulters:

[Kerala, group shipper, February 2003]

'Some years ago there were many shippers who defaulted and earned a lot of money. After that the buyers did not want to buy from them anymore. But nowadays the buyers seem to have forgotten what happened. Now they are buying from them again.'

Some of these shippers create an image of quality and build beautiful factories with the money earned from defaulting. They implement HACCP to 'impress the white people', but this is no guarantee of good quality:

[Kerala, group shipper, January 2005]

‘Medium and small shippers can also have very good factories. But having a beautiful factory is no guarantee for good quality. Many factories go for ISO and HACCP nowadays, but this can be ‘in principle’ or ‘in practice’. For many it is just in principle.’

One (certified) factory says very little about the other branch factories a shipper may own. Many shippers operate multiple (branch) factories at different locations including factories in other states. The largest group shipper in Kerala is said to operate over a hundred factories. Not all these factories are private property: many factories are leased from other processors or shippers who have—temporarily—left the business or who have been hired to carry out the processing. Buyers visiting for a few days do not go to see every factory. It is possible to trace branch factories, but tracking and tracing becomes a problem when shippers buy from the local market or ask cottage processors (commission factories) to process for them. This does not appear in the books. Group shippers are also said to be involved in these types of practices although some deny it because it is expensive and quality—especially hygiene and food safety—cannot be guaranteed.

It seems illogical that buyers would start buying from defaulters again. As we have seen defaulters are unreliable both with regard to quality and delivery, and they are also accused of being involved in malpractices. Why are buyers, therefore, willing to depend on unreliable sources and take the risk of making huge losses on contracts that are difficult to enforce? Do buyers really have such a ‘short memory’? If quality is an important issue, buying from defaulters brings with it the danger of compromising standards, including the social ones. The question is why do buyers chose to buy from unreliable shippers (again) when there are reliable shippers who are able to implement increasingly stringent standards and who perform as per the contract?

An important part of the explanation lies in the price difference between shippers. Many informants both in the Netherlands and in India suggested that price has become more important than quality. Food safety related quality has become a minimum requirement, but is not rewarded in the price. A price squeeze—also known as the battle in the chain—that started at supermarket level has been translated throughout the chain forcing buyers to source from cheaper shippers (see also Harilal *et al.*, 2006: 21). In the Kerala cashew industry it is the reliable and quality aware shippers who are now facing the consequences because other shippers can offer lower prices. Defaulters, for example, do not have to carry the costs of implementing and maintaining quality systems and even if these have been installed they can still offer lower prices because they can rely on monies earned from defaulting. Tax evasion and worker exploitation also contribute to the profits of this type of shipper:

[Kerala, group shipper, May 2003]

‘The companies that are less reliable and default also pay their workers less. Consequently, they can offer their kernels for a lower price on the market. This creates tough competition for the “fair” factories. The trade unions are bribed—even quite openly—to keep their eyes shut for this underpayment of workers.’

Buying from cheaper defaulters seems to be a calculated risk. Buyers are prepared to take the chance that prices will not rise and that the unreliable shipper will not default if they do. Risks are further reduced by short term contracts. Furthermore, buying from shippers without strict hygiene standards does not involve a great health risk at least as far as roasted cashew kernels are concerned because cashew is considered a low risk food product. However, this does imply that the standards being imposed on other (quality) shippers are being compromised.

Who are the buyers involved in such practices? They can be buyers who do not care where the kernels come from, but they probably would not ask shippers to improve their factories in the first place. It can be quality aware buyers, who are forced to buy from the other shippers because of the price squeeze:

[The Netherlands, purchasing manager salter, March 2004]

‘I regret that, because of the pressure on the price, we are forced to deal with other suppliers. I would have appreciated being able to do more with shippers like [mentions the name of a quality aware and reliable shipper, as to represent this category of shippers], because I have been investing in these contacts since 2000.’

This shift, however, does not necessarily involve direct contacts between buyers and (unreliable and less quality aware) shippers. Kernels are also bought from traders who are asked to supply loads at a certain price, which, considering the price squeeze, is quite low. Since traders also calculate a margin, they are more or less forced to buy from the cheaper shippers. Thus, while this type of buyer maintains an image of quality by continuing buying some loads from the quality aware shippers, they are nevertheless prepared to relax their standards and buy via traders and from other shippers for low prices as well. In addition, it has to be mentioned that buyers also increasingly buy from Vietnamese shippers, whose factories are said to be in better condition than the Indian factories, and the quality of Vietnamese kernels is considered slightly better, while the price is somewhat lower.

In addition to price differences, buying from defaulters and shippers without HACCP certification provides (certain) buyers with the opportunity of complaining when the price drops and arguing for a reduction in price (see Section 5). Here issues such as enforcing contracts or using the black list provided by for example CENTA as a guideline appear irrelevant. As a group shipper with a HACCP certified packing centre explains:

[Kerala, group shipper, January 2005]

'I do not get so many complaints when the price drops. Of course sometimes there are complaints, but not many. Buyers who continue buying from defaulters after a default, do this because then they can complain more about the quality. They deserve each other. It's the way the game is played.'

The low prices offered for (quality) kernels and the practice of continuing to buy from uncertified shippers does not encourage other shippers to invest in quality schemes. However, more and more buyers are asking for ISO and HACCP certification and the number of shippers applying for ISO and HACCP is increasing. However, the question of whether standards are being implemented remains and closely related to this is whether the issue of 'quality' can provide a solution to the problems facing the cashew industry:

[E-mail, group shipper, March 2005]

'I honestly don't think trying to be a high quality supplier is the answer to the business problems of the majority of the cashew exporters. And if too many shippers try to do this, they will end up losing money—that is what has happened over the last few years.'

More market research might be necessary to identify the actual demand for quality:

[E-mail, group shipper, June 2006]

'As far as processors are concerned, my take on the matter is that our mistake was taking murmurs for "improvements" from trading buyers seriously [...] investing in it without clear understanding as to the tangible value we were offering our customers and how differentiated our product is from that of competitors. Obviously our customers or their customers do not attach that much of value to it to even pay us the cost differential. Maybe we should have looked harder for customers that do. Maybe we should have looked for clear commitments before investing.'

What happened to the quality aware and reliable shippers introduced in Section 2? As far as we are aware, they are still—to a greater or lesser extent—involved in the cashew business. However, the shipper whose HACCP certified packing centre was described in Section 2 has shifted his focus to Japan, where buyers are said to be quality aware and willing to pay a premium price. This means he is no longer affected by buyers ready to buy from defaulters and the effects of price squeezes. The shipper who reduced his export volumes to survive and who considered leaving the business seems to be still involved in cashew processing but it is not clear to what extent. Finally, the shipper who was said to have the most modern factory in Kerala, who considered producing lower quality because he could not sell the high quality kernels has found a niche (at least, for the moment). In an e-mail he explained:

[E-mail, group shipper, March 2005]

‘After losing a lot of money by just trying to be the best good quality reliable shipper, we decided to try to find out what quality and service realms each user values, and where we can fit in profitable—and in some cases, [...] we have found buyers whose business has helped us grow profitably over the last year. I believe we offer product quality and service which helps these customers reduce their total cost and uncertainty, even though they may pay us more per pound. This has actually reduced our number of customers—many want more guarantees than we can offer and many don’t see any value in what we do—but our business has grown. However, I should add that the last year was a time when most buyers were unsure of supply, and wanted reliable suppliers. I am not sure how this would work out in times when supplies are high. And we now face the risk of being dependent on fewer customers.’

7. Conclusions

The assumptions in the literature on standards and market access that standards are becoming increasingly stringent and that actors who cannot meet these standards are hampered in their access to markets, while those who can maintain market access, does not reflect the situation in the cashew industry. As we have tried to show in this chapter standards are not ‘black boxes’ transferred from one actor in the chain to another. They are continually being put into practice in a malleable way, depending on relationships between the actors, objects and processes involved.

To a certain extent, malleability can facilitate trade, but the opposite is also true. Under present conditions this has led to diminished market access for quality aware and reliable shippers of cashew kernels. In other words, in the case of cashew, it is not those who cannot meet standards who are excluded, but those who have implemented them! In Kerala, it is the ‘bleeding edge’ of quality aware and reliable shippers who are actually suffering while unreliable and/or less quality aware shippers are increasingly being included in the production and trade networks.

The critical elements in the current process include the dynamic relationship between standards, contracts and contract enforcement, price levels and buyer and supplier relationships. To some extent the entire cashew processing sector face similar conditions including the low price of kernels. However, the ‘quality’ shippers who make extra costs to realise quality are experiencing a particularly sharp squeeze. Although quality has been suggested / requested by (certain) buyers it has not been rewarded in price or sales. The price squeeze initiated by supermarkets makes buyers reluctant to pay the costs involved in acquiring a better quality product and buyers are increasingly buying, directly or indirectly, from cheaper, unreliable (defaulting) and / or less quality conscious shippers. In fact these buyers create a (perceived) image of

quality by continuing to trade with some quality shippers but at the same time they compromise standards by (indirectly) dealing with cheaper shippers as well.

Buying from shippers who do not adhere to strict quality schemes provides some buyers with an opportunity to manipulate standards still further. They can complain about quality to get a reduction on the price and profit from the weak enforcement of standards and contracts. In the cashew industry price can exert a powerful influence because the product is generally considered to be a low risk food product and contracts are difficult to enforce.

For India to maintain its position on the world market, or at least with regard to the quality aware shippers, it may be necessary to further improve quality and safety standards if it is to compete with Vietnam. Buyers indicated that Vietnam has better (more hygienic) processing facilities, quality is considered slightly better and prices tend to be somewhat lower. However, it appears there is also a demand for lower priced cashew as well. This may mean that Indian shippers involved in the lower priced sector of the cashew market are kept in business. However, in the long run, it is suggested that the processes analysed here will have a negative influence on the entire chain. The repercussions will be felt not only by processors, but also by employees working in the industry, farmers, traders, retailers and consumers as well. More research on the way standards are put into practice needs to be carried out, not only in the cashew chain but also in other food chains, in order to gain more insight into the practices and consequences for the actors involved, their market access and the effects on food quality and safety.

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**Management
and
policy implications**

Quality Analysis Critical Control Points in consumer-oriented agro-food chains

Ruud Verkerk, Anita Linnemann and Martinus van Boekel

Abstract

Agricultural commodities produced in developing countries do not always satisfy the expectations of Western consumers with respect to the desired quality. Producers tend not to be acquainted with the wishes and demands of the foreign consumers of the products, and therefore cannot gear their production methods towards the desired product quality. Moreover, production chains do not always operate efficiently and effectively, adding an additional hurdle to successful market penetration. Design of a methodology with respect to the improvement of the performance of international agro-food chains implies the structural incorporation of four important elements in the process of food production, which are based on current scientific research for consumer-oriented product development, namely (1) reversal of the mode of operation of the agro-food industry from supply-oriented into demand-oriented; (2) a coordinated chain approach to the production, logistics and marketing of foods; (3) application of statistics and modelling techniques to deal with the complexity of optimising food production systems; and (4) incorporation of extrinsic food quality parameters into the production and supply chain.

A key issue in these four elements in relation to improved quality performance in the food chain is a comprehensible and explicit definition of food quality. Food quality is very complex since it needs to take 'the voice of the consumer' into account as well as 'the voice of the product'. 'The voice of the product' refers to the dynamics of specific product properties that are related to the quality and safety of the foods, whereas 'the voice of the consumer' embraces much more than only food safety and deals with consumer demands such as flavour, taste, texture, appearance, shelf life, nutritional value, health value and extrinsic quality parameters such as the applied production system. In this respect, it is essential for all partners in the food chain to distinguish between *food safety*, often highly prioritised by actors in the chain, and *food quality*, as desired by the final consumers. The agro-food business tries to minimise the possibility of producing foods that are detrimental to the health of the consumers. To that effect the industry has developed and adopted quality assurance systems like the Good Practices (e.g. Good Manufacturing Practice, Good Hygienic Practice), Hazard Analysis Critical Control Points (HACCP) and International Standard Organisation management systems (ISO). However, little attention has been paid to the development of methodology for incorporating consumer-oriented quality characteristics in the production system. In this chapter a novel tool called QACCP (Quality Analysis/Assurance Critical Control Points) is introduced to support

supply chain management in taking appropriate technological actions in a food chain to realise a desired consumer-oriented quality performance. QACCP is of another dimension than HACCP because HACCP is limited to the prevention of 'negative' quality aspects (physical, chemical and microbial hazards) whereas QACCP also encompasses 'positive' quality aspects.

1. Introduction

Food production systems are characterised by the production of raw materials coming from agriculture, horticulture, livestock and fisheries, processing (at primary, ingredient and product level), followed by distribution and retail and finally consumer processing. Production systems have the creation of value including quality in common, but also the maintenance of quality throughout the entire food supply chain in order to provide consumers with high quality products. Agricultural commodities from developing countries do not always successfully penetrate high-value markets in developed countries. An important drawback is that many products do not comply with food safety requirements (e.g. Henson *et al.*, 2000). Moreover, the products offered to the consumers tend not to satisfy the growing demand for agro-food commodities with specific and constant quality characteristics. Producers in developing countries do often not know the wishes and demands of the foreign consumers of the products, and therefore cannot gear their production methods towards the desired product quality. Moreover, food supply chains do not always operate efficiently and effectively, adding an additional hurdle to successful market penetration (Jongen, 2000).

In addition, consumer perception of quality has changed in the last decades, in that it encompasses not only product characteristics such as flavour, texture, healthiness, nutritional value and appearance but also aspects related to the production methods such as the use of non-renewable resources, pollution effects like the emission of toxic compounds and waste, and contribution to the economic and social welfare of smallholders. Furthermore, consumers demand a year-round supply of their preferred foods, for example in the category of fruits and vegetables.

A new type of approach is needed to meet these demands. In other words, we need to improve the supply chains in order to tailor the quality of agricultural commodities and the derived products such that they meet consumer demands. This approach should result in guidelines integrating pre-harvest and post-harvest conditions and production systems to be used by the different actors in the production- and supply chain to meet consumer demands. Quality modelling systems are such novel approaches; they describe and predict quality changes in relation to changing environmental conditions. Integrated chain control systems describe all aspects of the chain and link product quality to economic benefits enabling in this way optimisation of product quality.

2. Performance of international agro-food chains

A scientific challenge with respect to the improvement of the performance of international agro-food chains is how current research results and insights can be used to build a methodology to design viable export supply chains from less developed countries to more developed countries. This implies the structural incorporation of four important, innovative elements in the process of food production, which are presented below.

2.1. Consumer orientation

First of all the mode of operation of the agro-food industry has to be reversed from *supply-oriented* into *demand-oriented* (Linnemann *et al.*, 1999). In the past, especially in periods of relative scarcity, the food market consisted of those products that agricultural producers and food processors cared to offer for sale. However, markets have become (more) saturated since, and successful sales nowadays require a consumer-oriented approach. Western consumers are more demanding and better informed about the food they want to eat and how it is produced. They are increasingly aware of the interdependences between food production, processing and logistics, food consumption, their own health and that of the environment. This awareness, together with an abundant and diversified supply, has made consumers highly critical of, and demanding about, the quality and safety of food products (Van Trijp and Steenkamp, 1998). Furthermore, consumers are becoming more dynamic in their choices and more heterogeneous. Consequently, their food choices are becoming harder to understand and to predict (Linnemann *et al.*, 1999). Particular hurdles in satisfying consumers' demands and wishes are attributed to many interrelated factors such as demographical variables, and factors like preference and aversion, attitudes, habits and status (Sijtsema *et al.*, 2002). Also, the interpretation of what 'product quality' means changed considerably (Grunert, 2002). To gain a better understanding of what consumers want, how their wants change and how these changes can be promptly addressed is becoming a big challenge for the agricultural and food business.

Previously, products had to comply with demands regarding mainly price, taste and overall composition (e.g. fat content). Nowadays, the demands towards product composition are more specific (including, e.g. fat composition), and new demands regarding the production methods have been added (e.g. environment-friendliness, animal welfare and fair trade).

2.2. Chain approach

To efficiently and effectively incorporate consumers' wishes a coordinated supply chain approach is necessary, especially for vulnerable fresh food products (Jongen, 2000). In general, two main types of food supply chains can be distinguished: (1) supply chains for fresh agricultural products (e.g. fresh vegetables and fruit) and (2) supply chains for processed food products (e.g. fabricated foods, processed fruit/vegetables). The

actors in the fresh chains are breeders, input suppliers, farmers, distributors, auctions, wholesalers, importers, exporters, marketers and retailers. The main processes are handling, storing, packing, transportation, and trading of the product. In supply chains dealing with processed foods, agricultural products are used as raw materials for the production of products with higher added value.

The performance of a food supply chain refers to the relation between a chain and its environment. As such, the performance of a chain can be described as the chain output as it is perceived by its stakeholders (e.g. customers, governmental organisations, financial organisations, social organisation, etc.; Trienekens, 1999).

Chain cooperation in the food supply chain has proven to be beneficial in many ways. For example, supply chain management has shown its use for many years in terms of money, time and labour (Van der Vorst, 2000). Also, for food quality management a chain-oriented approach has been advocated (Luning *et al.*, 2002), since food products and the raw materials and ingredients used for their production are living materials that change constantly in time because of physiological, physical and microbiological influences. In this respect, quality assessment can be performed from different perspectives for which different definitions for 'good quality' are used. For example, a mango assessed early in the chain must be firm and immature, suitable for handling and transportation, whereas mangos purchased in the supermarket should be quite soft and mature, ready for consumption. The quality definitions differ, though the underlying physiological mechanisms causing the quality changes are the same. Moreover, technology plays an important role in managing these quality changes in the food supply chain.

In a consumer-oriented approach new product development will start with consumer and market research to identify the specific characteristics that a new food product has to have. The next step is to realise co-operation and information exchange among all the actors in the production chain. This gives rise to several new issues, like the question how the descriptive and qualitative terminology of the new product by consumers can be translated into technological product or process specifications. And next, how these technological specifications can effectively be passed on to the relevant actors in the chain.

2.3. Modelling

There is a need to apply statistics and modelling techniques to deal with the complexity of optimising food production systems. Food quality in relation to food supply chains has many subjective and objective elements, which are both situation specific and dynamic in time (Van Boekel, 2005). A consumer, however, may not analyse all elements of food quality one by one and consciously. Rather, he may give an integrated response based on complex judgements made in his mind.

The relationships between environmental conditions and quality attributes need to be studied and modelled to be able to predict changes in quality along the chain. There is a need for properly validated models that simplify representations in order to make a complex decision problem manageable. A major shortcoming of the models that are used in food science at present, is that they are deterministic and descriptive whereas they should be stochastic and explanatory (Van Boekel and Tijskens, 2001). A deterministic model does not incorporate variation: it yields one specific deterministic outcome. This applies, for instance, to the mechanistic models that describe the growth of micro-organisms in relation to variables such as time and temperature. However, in food science we need to take variation into account. Variation is inherent to the world we live in. Raw materials vary in their composition, environmental influences change over time, machines differ in their performance, etc.

2.4. Extrinsic food quality parameters

Finally, extrinsic food quality parameters must be incorporated into the product development process. The importance that consumers nowadays attach to the extrinsic quality of food products, i.e. the quality characteristics that are not part of the physical food product, necessitates food technologists to get acquainted with disciplines they were not used to before. For instance, consumers nowadays tend to attach importance to the environmental impact of the production systems that are used to generate their foods, to animal-welfare and social aspects like child labour and fair trade.

3. Food quality

When it comes to the delivery of products at the end of the chain to consumers, one of the keywords is quality; price is another one, not discussed in this context. Although everyone has an opinion about food quality, it is hard to define it univocally. Yet, this is what needs to be done. Food quality needs to take ‘the voice of the consumer’ into account as well as ‘the voice of the product’. ‘The voice of the consumer’ requires an integrated approach to food science, technology, nutrition and consumer science. On the other hand, ‘the voice of the product’ is about how a certain quality level can be obtained through a food science and technology approach and it demarcates what is possible with a certain product and what is not.

The consumers’ appreciation of food is the result of the interaction between several variables, namely the consumer himself (e.g. habits, culture, personality, mood and physiology), specific quality attributes of the food (clustered in sensory, health, production and convenience attributes), and the context or situation in which this interaction takes place (e.g. time, place, who with, how, what with) (Figure 1; Sijtsma *et al.*, 2002).

Quality, as seen from the consumers’ perspectives, is a multifaceted concept, based on quality expectations as perceived prior to consumption and quality experiences as

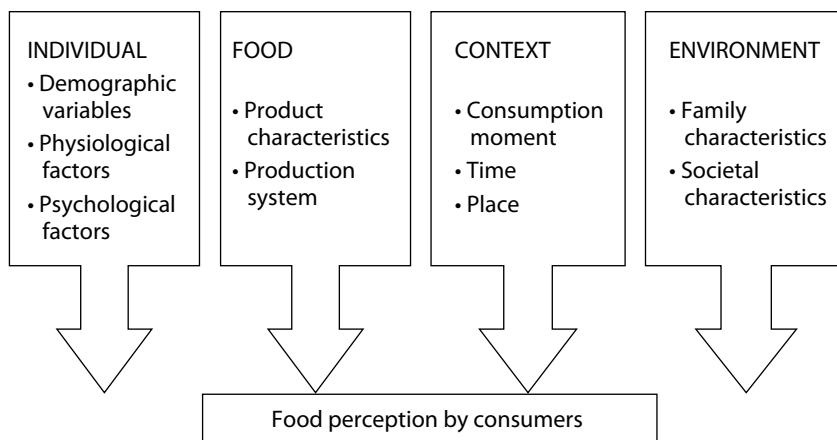


Figure 1. Food perception by consumers (Sijtsema et al., 2002).

perceived during and after consumption (Grunert, 2002). While quality experience is very much related to physical product properties, quality expectation is related to previous quality experience as well as information about the production methods, packaging and the appearance.

3.1. Quality attributes

From the previous paragraph it can be concluded that agro-food products have specific features that are turned into quality attributes by the perception of a consumer. In this respect, 2 groups have been identified, namely intrinsic quality attributes, i.e. inherent to the product itself, and extrinsic quality attributes, linked to the production method but not a property of the food itself (Luning *et al.*, 2002).

Intrinsic quality attributes refer to physical product characteristics and can be measured in an objective manner and by sensory evaluation. The combination of all these attributes together determines the intrinsic product quality. Intrinsic quality attributes are providing the stimuli for consumers and play an important role in the eventual quality perception. Intrinsic quality attributes can be divided, among others, into sensory and health attributes. *Sensory attributes* refer to the classical aspects of food quality such as flavour, taste, appearance, texture and smell. Taste, for example, is an experience quality that can be evaluated only after purchase and consumption of a product. During the last decades *health attributes*, such as nutritional and health-promoting values, have become equally important as sensorial attributes. However, a health-promoting product property as a choice criterion for consumers is a matter of communication and interpretation of various signals and is not an experienced quality that can be directly evaluated after purchase and consumption of a product.

Extrinsic attributes refer to the way in which the food is produced and can be divided into production and convenience attributes. *Production attributes* relate to consumer interest in production systems. Increasingly, European consumers are willing to pay premiums for organic products, for products produced with due concern for equitable income distribution, animal welfare or environmental considerations. These extrinsic factors commonly have no direct influence on the physical properties of the product, but they can be of overriding importance in the purchasing decisions of some consumers (Linnemann *et al.*, 2006). *Convenience attributes* are defined as aspects of food products that save time or energy household members typically spend on shopping, food storage, food preparation, eating, and food disposal. European consumers have a growing appreciation for convenience.

3.2. Deteriorating processes of quality attributes

Dissection of overall product quality into intrinsic quality attributes and extrinsic quality attributes makes quality more tangible for the food scientist. Since agro-food products are perishable by nature, most of the intrinsic quality attributes are susceptible to various deterioration processes that can occur in the food supply chain, in other words, quality defects may be due to different mechanisms (Luning *et al.*, 2002). *Microbiological* processes in foods, by bacteria, mould or yeast, can result in the development of undesirable sensory characteristics, including loss of texture, development of off-flavours and off-colours and finally in food spoilage. *Chemical* reactions, mainly non-enzymatic browning and oxidation reactions, can cause changes in appearance and lowering of nutritional value (e.g. vitamins). Generally, chemical changes occur during processing and storage of agro-food products. *Biochemical* reactions involve enzymes that can be responsible for many undesirable effects such as, for example, browning on cut surfaces of coloured fruits and vegetables (by phenolase), degradation of polyunsaturated fatty acids causing formation of off-flavours (by lipoxygenase). *Physical* changes are often due to mishandling of fresh products during harvesting, processing and distribution. Bruising or crushing causes development of rot during post harvest storage of fresh products. Also fluctuations in temperature and humidity causes phase changes and undesirable processes such as dehydration and absorbing water. *Physiological* reactions commonly occur during post-harvest storage of fruits and vegetables and strongly depend on storage conditions. The products still have a respiration rate and often the ripening hormone ethylene is produced affecting post harvest defects.

To control product quality, it is important to understand the different processes that affect the various quality attributes. Moreover, to be able to control changes for a specific quality attribute, it is necessary to identify the responsible mechanisms.

3.3. Globalisation

Globalisation of supply and marketing provides a large variety of products in the supermarkets, but also inevitably increases the risk of poor quality. Regarding food safety, this has resulted in an increasing number of food scares over the past decade

(BSE, dioxin, *Listeria*, *Salmonella*), creating a crisis of confidence among consumers. Obviously, the food sector tries to minimise the possibility of producing foods that are detrimental to the health of the consumers. To that effect the industry has developed and adopted quality assurance systems. Major quality assurance systems are the Good Practices (e.g. Good Agricultural Practice, Good Manufacturing practice, Good Hygienic Practice), Hazard Analysis Critical Control Points (HACCP) and International Standard Organisation management systems (ISO). However, while retailers are primarily driven by consumer demands that arise from food safety concerns, sensory and health attributes appear to be equally important for consumers (Grunert, 2002).

4. Quality Analysis Critical Control Points (QACCP)

Systems such as Hazard Analysis Critical Control Points (HACCP) are effective management tools to achieve and ensure production and supply of safe foods (Luning *et al.*, 2002; Ropkins and Beck, 2003). However, Western consumers usually see food safety as an implicit quality attribute; for them food quality embraces much more than just food safety. Nowadays, consumers have clear demands about other quality characteristics of their food such as flavour, taste, texture, appearance, shelf life, nutritional value, health value, convenience, etc. Yet, relatively little attention has been paid to the development of methodologies or systems for assessing and assuring consumer-oriented quality characteristics, a discrepancy that is particularly apparent in international agro-food chains where the distance between producers and consumers is at its maximum. Therefore, we address this shortcoming by introducing the concept of QACCP in food supply chains.

The term QACCP stands for Quality Analysis Critical Control Points and has been introduced in analogy with the management tool HACCP (Van Boekel, 2005). However, QACCP is of another dimension than HACCP because HACCP is limited to the prevention of 'negative' quality aspects (potential chemical, physical and/or microbial hazards) whereas QACCP also encompasses 'positive' quality aspects from a consumer-oriented perspective. QACCP promises to be a tool that can be used by management to take appropriate technological actions in a food chain to realise a desired quality performance. The nature of QACCP is the identification of critical points that affect quality and the translation of quality into specific quality attributes. Thereby providing chain actors with information on steps in the production system that has to be monitored and handled with extra care.

4.1. Approach

The QACCP approach is schematically represented in Figure 2. QACCP starts with the identification of consumer demands. Table 1 gives an overview of available tools that assist in 'hearing' the voice of the consumer (consumer demands). Each of the tools described in Table 1 has its merits and drawbacks, and one should realise that it is as yet not possible to capture consumers' motives for food choice and preferences unambiguously (Van Kleef *et al.*, 2002).

Quality Analysis Critical Control Points in consumer-oriented agro-food chains

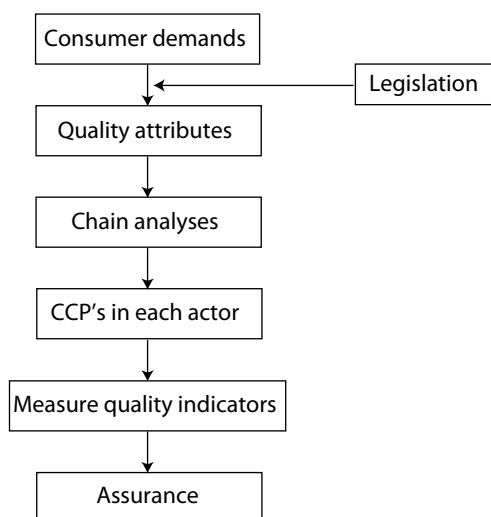


Figure 2. Identification of Critical Control Points in the chain.

Table 1. Tools to listen to the voice of the consumer in food product development.

Tool	Description	References
Focus group discussions	Discussing a topic in a group via a moderator	Casey and Krueger (1994); Köster (2003)
Questionnaires	Asking people questions via written questionnaires or via the internet	Dijksterhuis (1995); Risvika <i>et al.</i> (1997); Köster (2003)
Surveys	Analysing consumption tables	Dijksterhuis (1995); Risvika <i>et al.</i> (1997); Köster (2003)
Conjoint analysis	Assessment of different product concepts by consumers, finding out what the role of different components is; multivariate analysis	Moskowitz <i>et al.</i> (2004)
Means-end theory, laddering technique	Tries to identify motivations behind choices via individual, in-depth interviews	Costa <i>et al.</i> (2004)
Collage techniques	Identifies feelings, emotions and experiences with foods	Costa <i>et al.</i> (2003)
Quality guidance model	Relating quality expectation and quality experience to quality cues and quality attributes via partial least squares	Steenkamp and Van Trijp (1996)
Kansei engineering	Extracting product descriptors and feelings about products from consumers without asking rational questions	Oliveira (2003); www.jske.org

Next, the voice of the consumer has to be linked to the voice of the product (quality attributes), for which another set of tools is available (Table 2). Their application requires a critical approach, since some of these tools were not developed for food product design, and are not yet widely accepted. In the QACCP approach it is important to translate the consumer demands into controllable quality attributes as explained earlier, taking into account the legal requirements that aim to protect the health of the consumers.

Subsequently, the food supply chain needs to be characterised and the Critical Control Points (CCP's) affecting relevant quality attributes have to be established (Figure 3). This can be done by reviewing literature and consulting experts. After this, alternative strategies should be considered to obtain a better quality control. This could result in an alternative supply chain but also in a modification of a specific element in an existing link in the chain, such as an improved temperature control, or the introduction of modified atmosphere conditions. In this respect, predictive modelling of intrinsic quality attributes is essential, because quantitative models quickly can calculate the effect of proposed modifications. It is impossible to do this by trial and error because of the time involved and the complexity and large number of variables. The final step in the QACCP approach is the assurance of the critical quality control points in the food supply chain.

Table 2. Tools to link the voice of the consumer to the voice of the product in food product development.

Tool	Description	Reference
Quality Function Deployment (QFD)	Uses a matrix ('house of quality') that links consumer wishes to product properties	Benner <i>et al.</i> (2003)
TRIZ	Uses 40 inventive principles to overcome contradictions in design	Watzke and Saguy (2001); Mann and Winkless (2001)
Systematic inventive thinking	Uses 7 principles to come to innovation via an analysis of functions of components of the product	Goldenberg <i>et al.</i> (1999); Goldenberg and Mazursky (2002)
Chain Information Model (CIM)	Lists quality dependence diagrams for actors in a food chain	Benner <i>et al.</i> (2003)
Multi-criteria decision approach (MCDA)	Decision support system, defining the final objective, the relevant factors, and the options to reach the objective	Bevilacqua <i>et al.</i> (2004)
Bayesian Belief Networks (BBN)	Decision support system based on uncertain information using probability distributions	Corney (2000); Van Boekel <i>et al.</i> (2004)
Design of experiments (DOE), Taguchi methods	Investigates detailed settings of design parameters, establishes interactions between ingredients	Arteaga <i>et al.</i> (1994); Roy (2001); Schönkopf <i>et al.</i> (1996)

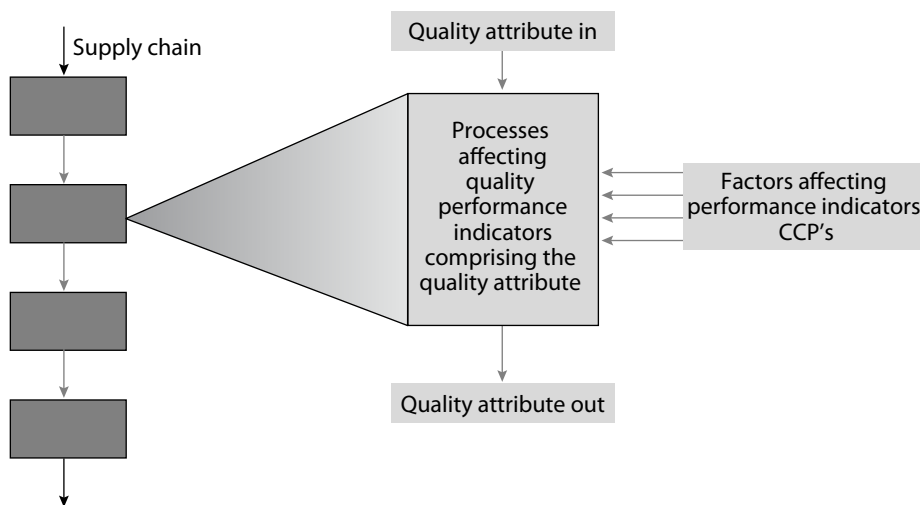


Figure 3. Schematic representation of the Quality Change Modelling approach for international agro-food supply chains.

5. Example: a case study on Nile perch (*Lates niloticus*) from Kenya

A field study on the current situation in the production and supply chain of Nile perch from Lake Victoria was performed in Kenya (Lake Victoria area) in April and May 2003. Additional information was obtained by literature research and expert interviews.

According to Myrland *et al.* (2000), fish quality as perceived by the consumer is defined by 'perceived taste' and 'freshness'. Common sensory evaluation methods determine fish freshness by the quality attributes appearance, odour and texture, while appearance is related to colour, skin bruises and bloodspots (Martinsdottir, 2002). Furthermore, nutritional value and health considerations are important attributes in decisions to purchase cod. Also, there are geographical differences in consumer preferences, southern E.U. consumers (Spain, Italy) prefer thinly skinned and slightly fatty fillets, while the northern E.U. consumer (Belgium, the Netherlands, Germany) prefer the fillets to be small and deeply skinned.

Legal requirements for fish include sensory evaluations such as described above and maximum levels for several safety-related chemical and biochemical parameters:

- total volatile base-nitrogen (TVB-N) and trimethyl amine-nitrogen (TMA-N);
- toxic heavy metals (cadmium, mercury, lead);
- pesticide residues (pirimiphos-methyl and pyrethrins for dried fish);
- microbiological tests (Total Plate Count, Total Coliforms, *Pseudomonas* spp, *Escherichia coli*, *Salmonella* spp., *Staphylococcus aureus*, *Vibrio cholera*).

Nile perch from Kenya is marketed locally, domestically and abroad (Figure 4). The Nile perch chain goes via traders, either directly or through co-operatives, and industrial processes account for over 90% of all Nile perch trade. The fish is exported fresh, or as fresh or frozen fillets. Domestically Nile perch is also sold dried.

The Critical Control Points (CCP's) are mainly concentrated upstream the Nile perch chain. Especially, the catching method, handling and storage regimes of the Nile perch are important CCP's in the upstream chain. Firstly, the fishing methods, fish caught with hooks was reported to have less quality problems unlike fish caught with nets. This was attributed to bruises when fish is entangled in the net which is reportedly not the case with hooks. Furthermore, the fishermen kill the fish by smashing the heads or body with their bare hands or let the perch die in the open air. The preferred way is hitting the head, so the fish is killed fast. Secondly, the physical handling, rough handling and struggling of the fish will result in bruises. Normally the fish are thrown on the bottom of the vessel and covered with wet material like papyrus leaves, sisal bags or nets and transported to the landing site. However, the impact of mishandling fish is often not directly visible at the landing beach, though after several hours or even days the detrimental effect is emerging (at the factory). Also, possible internal damage could not immediately manifest unless fish is filleted. Thirdly, fishers face major constraints in terms of lack of cooling facilities, for example ice is virtually not

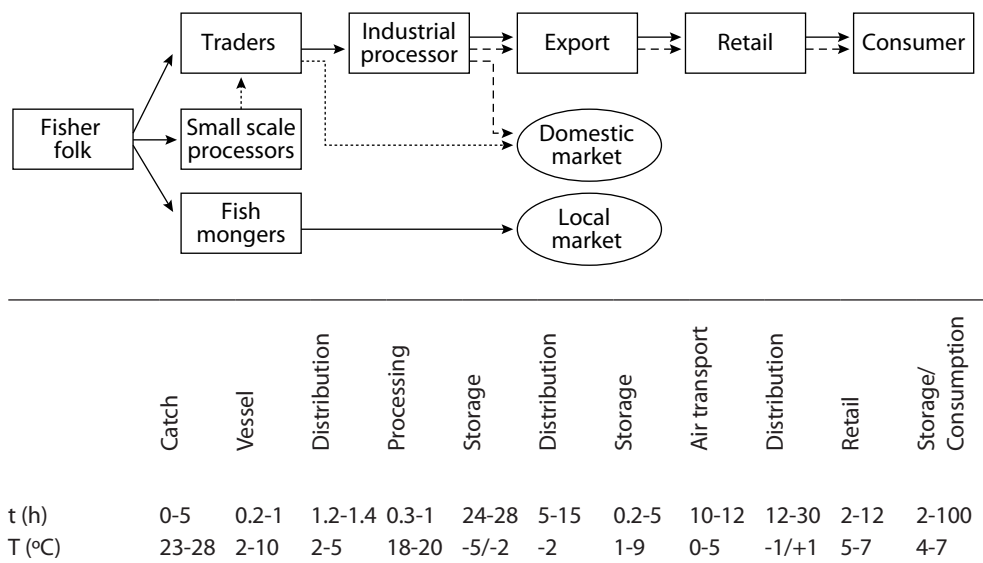


Figure 4. Marketing channels for Nile perch from Lake Victoria in Kenya to the E.U. (adapted from Henson et al. (2000)), including associated time and temperature course in the fresh Nile perch chilled fillet chain. Straight lines represent the fresh product, dashed lines the frozen fillets and dotted lines the dried fish.

readily available. Also, strong delays occur due to wind problems or are due to lack of adequate fish to land. On average fishers estimated to take about 5-8 hours between fishing and landing, sometimes it even takes more. Also it can take a long time for delivery fish at the factory, thereby reducing the fish to ice ratio. Hence fish spoilage could be inevitable even if fish is in ice.

Recently, a method for sensory evaluation of raw fish stored in ice has been developed, called Quality Index Method (QIM). The value (Quality Index) obtained with this method is used as the performance indicator for the appearance, odour and texture of the perch. The scientific development of QIM for various species aims at having the Quality Index increase linearly with the storage time in ice and is used in practice to evaluate quality and make predictions under restricting conditions (Martinsdottir, 2002; Baixas-Nogueras *et al.*, 2003; Sveinsdottir *et al.*, 2003). The Quality Index (QI) is an overall sensory score (expressed as storage days), based on index points for odour, texture and appearance attributes, which is used as standard assessment of freshness in many countries throughout Europe (Sveinsdottir *et al.*, 2003; Vader *et al.*, 2003). The QIM can only be applied for constant temperature profiles. This is a limiting condition for chain analysis since temperature fluctuates throughout a supply chain.

Finally, in order to convert quality *Analysis* into quality *Assurance* within QACCP it is essential to apply a techno-managerial approach, in other words, including the behaviour of the people in the chain (e.g. fisher men and traders).

6. Conclusion

Application of the QACCP concept could be useful to facilitate the (re)design of products, or even whole supply chains, instruct chain actors on improved handling in order to produce consumer-orientated, high quality foods. Applying QACCP in international agro-food supply chains could serve 3 objectives: (1) identification and analysis of the most influential critical quality control points in the food supply chain, (2) assurance of the critical quality control points in the food supply chain, and (3) use the CCP's to design strategies for enhancement of end product quality. The QACCP philosophy needs to be incorporated throughout the entire food supply chain 'from fork to farm' and should include the understanding as well as the assurance of quality as perceived by consumers.

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The role of producer organisations in quality-oriented agrifood chains; an economic organisation perspective

Jos Bijman

Abstract

This chapter argues that producer organisations may be an efficient governance structure for transactions with quality food products. These transactions often experience three governance problems: safeguarding specific investments, difficulty of measuring performance, and coordinating interdependence activities. To solve these problems, and thereby reduce transactions costs, governance structures combine several governance mechanisms. One of the major contributions of this chapter is the distinction that is made between formal and informal governance mechanisms. By focusing in on governance mechanisms instead of governance structures, distinctions can be made among so-called hybrid governance structures. This paper applies the theoretical framework to only one hybrid governance structure: the producer organisation. As producer organisations combine contractual, organisational and social mechanisms, they may be well suited to tackle the various governance problems in transactions with quality food products.

1. Introduction

How can the interests of a large number of (small-scale) farmers be aligned with the interests of their trading and processing customers? How can the activities of the various participants of the (international) agrifood chain be coordinated in improving and guaranteeing food quality? While there may be several ways of answering these questions, in this paper I will focus on the governance of interorganisational relationships in the agrifood chain. More specifically, I will focus on the governance of transactions between producers and their customers, where these customers can be traders, processors or retailers.

The traditional perspective in studying the governance of transactions is to focus on the link between transactions characteristics, transactions costs and governance structures. For transactions between producers and their customers, various governance structures (or modes of organisation) can be found, such as spot markets arrangements, production contracts, marketing contracts, or vertical integration. The latter implies that the transaction is carried out within the boundaries of one firm. Vertical integration can take two forms: the customer has full control (through ownership) over the producer, or the producer has full control over the customer. The former is rather uncommon in agrifood chains in the developed world, but it can still

be found in developing countries for crops that are grown on large plantation-type of agricultural firms, such as in the production of tea, coffee, oil palm, and bananas (Pryor, 1982). Producers gaining full control over their customer can be found in developed and developing countries, in the situation where large farmers carry out themselves the processing and/or marketing of their products. More common, however, is the situation where a number of producers jointly own processing and/or marketing assets: the producer organisation (PO).

In this chapter, I will defend the argument that producer organisations are one of the main governance solutions to transactional problems present in the producer-customer relationship. A PO is a joint economic organisation, established by and for producers, to promote their economic development. A PO is a voluntary organisation, with a democratic decision-making structure⁵⁸. POs exist in various forms, depending on the legal environment, the business culture, and the type of service provided to the members. The term PO covers cooperatives, producer associations, producer groups and other forms of economic structure, to the exclusion of farmer unions, interest groups and other forms of non-economic associative body⁵⁹.

This chapter studies the governance of quality-oriented transactions from an economic organisation perspective. This means that the governance structure used for producer-customer transactions can be considered as an organisational solution to efficiency problems in those transactions. More specifically, a governance structure is chosen to economise on transaction costs. In this chapter I make an important distinction between two types of transaction costs: motivation costs and coordination costs. The problem of motivation assumes information incompleteness and conflicting interests, the problem of coordination assumes information incompleteness and common interests. Enhancing and guaranteeing quality in agrifood chains bring along specific transaction costs related to safeguarding investments, measuring performance and reducing opportunistic behaviour, and coordinating interdependent activities.

The issue of connecting (smallholder) farmers to domestic and foreign consumers, and of helping (small) producers to comply with quality demands by foreign customers, has received much attention in recent years, both from academics and policy makers⁶⁰. A large part of this research and discussion deals with how to improve the working of markets, for instance by implementing appropriate legal institutions and by improving market transparency. Another part of the discourse focuses with the need to incorporate small producers in (international) vertically coordinated agrifood chains (e.g. Ruben *et al.*, 2006). However, even in transparent markets most individual

⁵⁸ This definition does not include producer organisations that have been set up by the state and apply compulsory membership. These farmer collectives have been quite common in communist countries.

⁵⁹ The International Federation of Agricultural Producers (IFAP), in a 2004 *Statement on Economic Organisations of Agricultural Producers in the World* uses the term Economic Producer Organisation (EPO). While I focus on economic organisations, I prefer to use the more common denomination of Producer Organisation (PO).

⁶⁰ For instance the large international collaborative project “Regoverning Markets: market access for small-scale producers” (www.regoverningmarkets.org).

producers are too small to obtain interesting trading partners, resulting in a lack of market opportunities or an adverse bargaining position. POs can be a solution to this lack of bargaining power. My argument, however, is that a PO not only improves the bargaining position of its members, but also reduces the transaction costs that are related to improving and guaranteeing food quality.

This chapter is structured as follows. In Section 2 I will present the producer organisation, its structure and its functions. In Section 3 I will develop the theoretical framework based on economic organisation theory. In Section 4 I will apply the theoretical framework to food quality issues, focusing on transactions costs related to developing quality foods and guaranteeing food quality and the governance mechanisms that may be chosen to reduce these costs. In Section 5 I will discuss how producer organisations, as a specific governance structure, can help to reduce the transaction costs related to food quality. Section 6 concludes with a summary and some notions on the challenges for the PO in supporting food quality in the (international) agrifood chain.

2. Producer Organisations

A Producer Organisation (PO) is an organisation established by agricultural producers for the purpose of supporting their economic well-being. POs vary in form from country to country and from product to product. This diversity of form is reflected in differences of objective, economic dimension, legal status and internal structure. To develop a definition of a PO we may paraphrase the definition of the cooperative used by the International Cooperative Alliance (see Birchall, 1997: 65): ‘A PO is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically-controlled enterprise⁶¹. In other words, a PO is both an association of members and an enterprise in which economic activities take place. It is in the association where social processes of democratic decision-making and informal communication take place, and it is by the enterprise that economic benefits for the members of the association are gained. This dual character of the PO has long been acknowledged in the literature on agricultural cooperatives (see Draheim, 1955; Van Dooren, 1982).

Despite the spatial and temporal diversity found among POs, they share a number of common characteristics⁶²:

⁶¹ While this definition talks about “economic, social and cultural needs”, the focus in this chapter is on the economic function.

⁶² The ICA had developed seven principles on which cooperatives are (or should be) based: (1) Voluntary and Open Membership; (2) Democratic Member Control; (3) Member Economic Participation; (4) Autonomy and Independence; (5) Education, Training and Information; (6) Co-operation among Co-operatives; and (7) Concern for Community (see: www.coop.org).

- *A PO is a form of collective action.* As agricultural production in most of the world is carried out by small farms, there are good economic reasons for these farmers to pool their risks, to collectively market their product, and to collectively buy or produce the farm inputs they need. In other words, a PO groups individual farmers for the purpose of joint economic action.
- *A PO is established bottom-up,* that is, by the producers themselves (albeit sometimes with the aid of outside parties like the state or development agencies). Membership is voluntary, and producers can join or resign as long as they comply with the membership regulations.
- *A PO has a democratic decision-making structure.* All members have a voice and at least one vote. The members jointly decide on what functions the PO should perform, what strategies it should follow, and what investments it should make. The details of the decision-making process may vary depending on the size the organisation (where large organisations often use a tiered decision-making structure) and the culture of the political processes.
- *A PO is member-owned and member-controlled.*⁶³ Member-owned implies that the equity capital needed by the enterprise is put in by the members. Member-controlled implies that the members decide on the activities and investments of the PO. While the transaction relationship between the members and the PO is of an individual nature, the ownership relationship is of a collective nature. This means that individually members cannot exert control over the PO. Both control and ownership are collective.
- *A PO is an economic organisation,* as its main purpose is to enable its producer members to enter the market or enhance their position in the market, whether this is an input market or a farm product market. This economic function is performed by the jointly owned enterprise, which operates in competition with other member-owned and non-member-owned firms.
- *A PO is a user-oriented firm,* and not an investor-oriented or family-oriented firm. Users aim at making a profit (or a living) with their own business (their own farm), while the service of the PO is in support of this aim. Applying a property rights perspective (Barzel, 1997), we can say that the users are the residual claimants. They benefit through use (also named patronage), and not through the investment they have in the PO. The more use a member makes of the services provided by the PO, the more he/she benefits from membership.
- *A PO has a medium- or even long-term perspective.* As a PO is intrinsically tied to agricultural production, the time scope of the PO is directly related to the timeframe common in farming. As agricultural production requires long-term investments and is usually carried out in production units that are family-owned and carried over from generation to generation, a PO necessarily has a long-term perspective. This timeframe, both of the associated producers and the PO,

⁶³ In the economic literature on cooperatives, one often finds the following definition: a cooperative is an organisation that is established for the benefit of the user, is user-owned and user-controlled (e.g. Barton, 1989).

supports the development of common norms and values (i.e. informal governance institutions).

- *A PO is an association of members.* This implies that the PO is a social community, with social processes like commitment, identity, solidarity and informal information exchange.

As said, POs have been established in order to support the economic well being of the member-producers. This general purpose can be obtained by a number of more specific objectives, such as (a) to overcome market failures, when access is constrained or when markets do not exist; (b) to gain economies of scale; (c) to strengthen bargaining power in the relationship with customers or suppliers; (d) to share risks, for instance in market risks or risks related to natural conditions; (e) to reduce transactions costs, for instance by making the market more transparent; and (f) to foster innovation, which often requires investments and brings risks that cannot be borne by individual producers. These objectives have been reasons for setting up POs. They were valid more than hundred years ago when many cooperatives were established in Western Europe and North America, and they still apply today to the establishment of new POs, both in the developed and the developing world.

Within the (international) agrifood chain, whether we conceptualise it as beginning at the producer and ending at the consumer or initiating at the consumer and terminating at the producer, the PO has one or more specific role(s). The main role is to link producers with customers, in other words to find a market for the products that the members of the PO produce. The PO is located at the upstream part of the chain. Even if it has activities more downstream in the chain, these activities should be beneficial to the producers located at the upstream stage. Whatever its activities in the chain, the PO is always linked to its member-producers and their interests. Depending on its strategy, the PO can perform different functions in the chain, from simple bargaining on behalf of the members to complete processing and marketing of the products delivered by the members. Whatever its function, a PO should operate in an efficient way as it competes with non-farmer-owned enterprises. If the PO does not produce benefits for its members, the latter have no reason to continue membership⁶⁴.

3. Governance, governance structures and governance mechanisms

In this section I develop a theoretical framework that can be used to evaluate particular modes of organising transactions, more specifically to assess the efficiency effects of particular governance structures. In developing my argument, I will make a distinction

⁶⁴ The issue of benefit on the short term or on the long term has always raised much discussion among members of a PO, and particularly between members and board. POs have a long-term perspective and may sacrifice short-term profits to guarantee sustainable benefits. Another issue of whether the PO generates sufficient benefits for its members is that most POs function as a yardstick for non-PO firms. In other words, because of the existence of a PO, other firms seem attractive alternatives. If the PO did not exist, non-PO firms would be less attractive alternatives.

between governance structure and governance mechanisms. A governance structure consists of a set of governance mechanisms. Thus, these concepts represent different levels of analysis.

All transactions between two or more economic actors come with transaction costs. These costs relate to finding a market, negotiating, signing a contract, controlling contract compliance, switching costs in case of premature termination of the contract, and all lost opportunities. Williamson (1985) makes a useful distinction between *ex ante* and *ex post* transaction costs, that is, transaction costs that are incurred before and after entering into a contract. In order to reduce transaction costs parties to a transaction develop or choose an institutional and organisational structure, a so-called governance structure. The term governance structure has been introduced by Oliver Williamson (1979) in one of his seminal articles on Transaction Cost Economics (TCE). He defines a governance structure as 'the institutional framework within which the integrity of a transaction is decided' (Williamson, 1979: 233). A more informative definition is provided by Hendrikse (2003: 243): a governance structure consists of the rules by which an exchange is administered.

Governance structures are developed or explicitly chosen to support the execution of transactions in the most efficient way. The choice of governance structure depends on a comparative analysis of transaction costs of alternative structures. Assuming equal production costs, TCE predicts that the governance structure associated with the lowest transaction costs will be chosen to govern the transaction (Williamson, 1985, 1991). Thus, the main function of a governance structure is reduce transactions costs that result from governance problems. Rindfleish and Heide (1997) distinguish between three governance problems that are the main causes of transaction costs: safeguarding transaction-specific investments, solving difficulties in performance measurement, and adaptation of the transaction to changing environmental conditions. While the latter governance problem, adaptation, seem to focus on *ex post* transaction costs, there are also *ex ante* transaction costs in adapting (better: aligning) the individual activities of the transaction partners. Therefore I use the broader concept of coordination, as has been suggested by Milgrom and Roberts (1992) and Gulati and Singh (1998). Coordination costs are a separate group of transaction costs that result from the need to coordinate individual but interdependent activities (and investments). Following Milgrom and Roberts (1992) I categorise the first two governance problems under the term motivation, as the challenge is to motivate transaction partners to abstain from opportunistic behaviour. Motivation problems result from (potential) conflicts of interests and incomplete (or asymmetric) information. The coordination problem is also the result of incomplete (or asymmetric) information but it is present even when transaction partners acknowledge common interests. Table 1 shows these governance problems and the related transaction costs. I will briefly elaborate on each of these governance problems.

It was Williamson (1975) who first posited that a governance structure is chosen in order to economise on transaction costs. He assumed that all human behaviour is

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Table 1. Governance problems and transactions costs (adapted from Rindfleisch and Heide, 1997).

Governance problems			
	Safeguarding specific investment	Measuring performance	Coordinating interdependent activities
Type of governance problem	Motivation	Motivation	Coordination
Direct transaction costs	Costs of crafting safeguards	Screening and selection costs (<i>ex ante</i>)	Communication and decision-making
Opportunity costs	Failure to invest in productive assets	Measurement costs (<i>ex post</i>)	
		Failure to identify appropriate partners (<i>ex ante</i>)	Maladaptation
		Productivity losses through effort adjustments (<i>ex post</i>)	Failure to benefit from synergy

characterised by opportunism and bounded rationality, which can lead to conflicts over the benefits and continuation of transactions. Later, he emphasised three basic elements of all transactions: mutuality, conflict and order. ‘Governance is a means by which to infuse order in a relation where potential conflict threatens to undo or upset opportunities to realise mutual gains’ (Williamson, 1999: 1090). In other words, a governance structure furthers the efficiency of a transaction by preventing and solving conflicts that may hamper the realisation of mutual gains. For these mutual gains to be obtained, transaction partners need to make investments that are specific to the transaction (or better: to the relationship). Transactions with specific assets are vulnerable to the *ex post* hazards of hold-up and premature contract termination (Williamson, 1985; Klein *et al.*, 1978). It is the inherent incompleteness of any contract that gives room to opportunistic behaviour. Without appropriate safeguards, firms face the risk of expropriation (*ex post*) or productivity losses resulting from the failure to invest in specific assets (*ex ante*). Thus, a first function of a governance structure is to safeguard transaction-specific investments.

A second function of a governance structure is to solve the governance problem of performance measurement. Uncertainty about the behaviour of the trading partner gives rise to a performance evaluation problem. If task performance is difficult to measure, people may take the opportunity to reduce their effort. This problem of shirking is known in agency theory under the name of moral hazard (Eisenhardt, 1989). To solve this problem, direct measurement costs may need to be incurred. There may also be an *ex ante* performance measurement problem, known as adverse

selection: information asymmetry impedes ascertaining a party's true characteristics prior to exchange. This form of asymmetric information gives rise to direct transaction costs in the form of selection and screening efforts designed to identify appropriate exchange partners a priori. To the extent that *ex post* performance measurement is very difficult (or costly), equitable distribution of rewards across parties may be impossible (Ouchi, 1979). If rewards are not allocated equitably, a party may eventually reduce its individual efforts. Thus, a performance measurement failure may lead to opportunity costs in the form of productivity losses.

Besides addressing appropriation concerns related to specific investments and performance measurement, a governance structure should also address coordination problems (Gulati and Singh, 1998). Coordination problems arise due to the lack of shared and accurate knowledge about the decision rules that others are likely to use and how one's own actions are interdependent with those of others (Gulati *et al.*, 2005). Coordination can be defined as the act of managing interdependencies between activities performed to achieve a goal (Malone and Crowston, 1990). Inter-organisation coordination costs arise in transaction relationships where partners have agreed upon a division of labour and have to manage, across organisational boundaries, activities to be completed jointly or individually (Gulati and Singh, 1998). As coordination requires information exchange and decision-making, the associated transaction costs include the direct costs of gathering and processing information and of organising a decision-making process. In addition, a failure to align interdependent activities involves an opportunity cost of lost synergy. Finally, there are costs of coordination in a dynamic sense, often referred to as joint adaptation (Williamson, 1991). If adaptation does not take place in a coordinated way it leads to an opportunity cost of maladaptation.

Now I have explained what the function of governance structure is, namely solving governance problems and thereby economising on transaction costs, I come to the next question: how to governance structures solve these problems. TCE does not give us much information on the workings of governance structures. Williamson (1991) distinguishes between three governance structures: market, hybrid and hierarchy. These structures lie on a continuum, with market and hierarchy being the extreme positions. Hybrids are everything in between these poles, and could be (long-term) contracts, strategic alliances, joint ventures, franchise systems, or producer organisations). However, this categorisation in three groups has received much criticism. Grandori (1997) argues that a distinction in such broad categories does not bring us much further in the study of how to align transactions with governance structures. Moreover, she claims, these categories are inhomogeneous. As an alternative, she suggests to shift the level of analysis by studying the constitutive mechanisms instead of the governance structures themselves. Hennart (1993) already argued that market and hierarchy are only abstract governance structures, and that in reality all governance structures combine elements of market and hierarchy.

In the literature on interorganisational relationships, various categorisations of governance mechanisms can be found: formal and informal mechanisms (Dyer and Singh, 1998; Zenger *et al.*, 2002); price, authority and social mechanisms (Bradach and Eccles, 1989); motivation and coordination mechanisms (Milgrom and Roberts, 1992); output based or behaviour based mechanisms (Ouchi, 1979); contractual and procedural (Sobrero and Schrader, 1998). In this chapter on the role of producer organisations and food quality, I am particularly interested in the distinction between formal and informal governance mechanisms.

Formal mechanisms can be divided into two categories: contractual or outcome-based mechanisms and organisational or behaviour-based mechanisms (Table 2). Examples of outcome-based governance mechanisms are incentive and reward systems, founded on either contractual agreements (Williamson, 1975) or ownership of assets (Grossman and Hart, 1986). In addition, joint goal setting may result in lower incidence of governance problems (Das and Teng, 1998). Behaviour-based governance mechanisms work through the granting of authority to one particular actor (Stinchcombe, 1985). Thus, authority is used to develop and execute command structures, standard operating procedures, performance monitoring systems, and dispute settlement procedures (including the use of sanctions). These formal mechanisms based on rules, incentives and authority support interorganisational transactions by reducing governance problems both *ex ante* and *ex post*.

Informal mechanisms, also referred to as social control and relational governance, relate to mechanisms of identity (Kogut and Zander, 1996), embeddedness (Granovetter, 1985), trust (Nooteboom, 2002), and routines (Nelson and Winter, 1982). Embeddedness has two dimensions: relational and structural (Granovetter, 1992; Uzzi, 1997). Relational embeddedness refers to the ongoing social relationship that results from repeated transactions with the same partners. Structural embeddedness refers to the fact that the dyadic relationship is embedded in a community of former, current and potential exchange partners. Being part of a community, where information on individual behaviour is exchanged along informal lines, establishes the reputation effect. This means that within the community information exists on the trustworthiness of both current and prospective business partners. Other examples

Table 2. Mechanisms of governance.

Formal		Informal
Contractual	Organisational	
Outcome (market)	Behaviour (hierarchy)	Social (community)
Goal setting; incentive and reward systems; rules	Authority (direct supervision, standardisation, monitoring and sanctions, mutual adjustment); rules	Partner selection; identity; norms; reputation / trust; routines

of informal institutions of governance are collective sanctions, partner selection, and macro culture (Jones *et al.*, 1997). While certain informal mechanisms may be more important at the start of a relationship, such as reputation and partner selection, other mechanisms are particularly useful in reducing transaction costs during the relationship, such as establishing identity (or common norms and values) and building routines. Reputation and the role of trust are important both *ex ante* (i.e. when entering a transactional relationship) and *ex post*, as actors may continue to care about their reputation and trustworthiness. The longer a relationship between two actors lasts, the more opportunity they have to build trust between themselves. By sharing information, joint goal setting, joint problem solving, and joint decision making partners can increase commitment to and common interest in the outcome of the relationship (Das and Teng, 1998; Uzzi, 1997). The governance effects of trust are founded on shared identity, in the case of norm-based trust, or on expectations and reputation, in the case of cognition-based trust (Lane and Bachmann, 1998).

Outcome, behaviour and social based mechanisms of governance are often associated with the conceptions of market, hierarchy and community (or network) types of governance (Ouchi, 1979; Bradach and Eccles, 1989). However, there is no simple one on one relationship between particular governance mechanisms and particular governance structures. In reality, all governance structures use several governance mechanisms, in various combination and various intensities. For instance, Grandori (1997: 32) argues that network and hierarchy can be distinguished on the basis of the allocation of property rights, while network and market can be distinguished on the basis of the type of coordination mechanisms employed.

So far I have listed the various governance mechanisms that can be used to reduce governance problems and thus reduce transaction costs. As I have distinguished two types of governance problems—motivation and coordination—the question remains which mechanisms are most appropriate to solve particular governance problems. This question cannot easily be answered as most governance mechanisms have impact on both motivation and coordination. Among the few scholars that having studied this issue are Gulati *et al.* (2005). They present the following distinction between mechanisms that support motivation and mechanisms that support coordination. The problem of motivation is resolved by aligning interests through formal mechanisms such as contracting, common ownership of assets, monitoring and sanctions, and the prospect of future interactions. Informal mechanisms such as identification and embeddedness may also serve to align interests. The problem of coordination is resolved through such formal mechanisms as standardisation, direct supervision and mutual adjustment (Thompson, 1967; Galbraith, 1977; Mintzberg, 1979)⁶⁵, each of which serves to enhance the knowledge about others' actions and about the interdependence of actions. Informal mechanisms that reduce coordination costs by 'prescribing' how to behave are shared experience, routines, culture, shared values and norms, and membership.

⁶⁵ Gulati *et al.* (2005) actually use the words programming, hierarchy and feedback.

In the next section I will use this framework on governance problems and governance mechanisms to assess transactional problems related to enhancing, maintaining and monitoring food quality in transactions in agrifood chains.

4. Food quality and the choice of governance mechanisms

Food quality brings about specific governance problems. These problems relate to the costs of safeguarding investments, measuring performance and coordinating interdependent activities. Improving quality requires investments, such as developing and using new varieties or applying specialised processing techniques, that are often specific to a particular transaction or relationship. To maintain and assure food quality it is necessary to measure quality attributes, sometimes at different stage of the chain. However, not all desirable and undesirable attributes can be measured easily or in a low cost way. In addition, enhancing and assuring food quality often requires aligning complementary activities by different chain participants. In sum, transactions with quality food products face various governance problems, which participants in the chain seek to solve by applying particular governance mechanisms. In this section I will first discuss the three main governance problems that are related to (enhancing) food quality. Subsequently, I will review a number of governance mechanisms and governance structures that has been presented in the literature as a means to solve the governance problems.

4.1. Governance problems

Measuring performance may be problem in transactions with quality food products between independent chain participants. Many quality attributes of food products are so-called credence characteristics. This means that it is for the customer difficult to check whether the claimed quality attribute is actually present. For instance, for organically produced food products, it is impossible for the consumer to check whether the producer has really complied with the organic farming requirements or not. The same is true for attributes like applying animal-friendly or environment friendly production methods. When such uncertainty or asymmetric information exists, it leaves room for opportunistic behaviour. When identifying quality is uncertain, difficult or costly, customers will not pay the highest price for the highest quality product (this is the adverse selection problem)⁶⁶. For the farmer the incentive to invest in enhancing and assuring quality is reduced relative to the perfect information scenario. As a result, underinvestment in the provision of quality occurs. The problem may be particularly

⁶⁶ In November 2006 consumers in the UK found out they were cheated when buying free-range eggs. The eggs, originating from France and Italy, were actually produced by chicken held in battery cages. After being imported into the UK the eggs were repacked and labelled as free-range. The price for free-range eggs is twice the price for factory-farm eggs. Producers of free-range eggs fear consumer reluctance to pay the higher price for free-range eggs when they have no guarantee that these eggs are actually produced under free-range conditions (Newspaper report in Dutch daily newspaper *NRC Handelsblad*, 16 November 2006).

relevant for products where quality is hard to identify in the raw material, or is at a premium. Examples may be produce for niche markets (e.g. organic), produce for processors who need consistent inputs (e.g. in vegetable processing), and produce prone to food safety problems.

The governance problem of safeguarding specific investments is present when one of the chain participants makes investments in improving quality and is depending on the continuous collaboration of the other chain participants to earn back its investment. These specific investments carry the risk of ex-post appropriation of quasi-rents. Such investments can be for instance in developing and planting special crop varieties (for specialty products), in establishing specialised processing equipment (for instance in processing organic milk separate from standard milk), and in building specialty brand names. Let me zoom in on the issue of safeguarding investments in a quality brand. A brand name (or any other form of reputation) is an investment specific for the transaction between the brand owner and anyone who co-determines the quality of the product that is sold under that brand. In situations of incomplete contracts, transaction partners such as suppliers to the brand owner may try to appropriate a larger share of the value created by the brand, for instance by cheating on the effort needed to produce the required quality (see the example in note 66). The owner of the quality brand, having invested in establishing the brand and therefore in a reputation as a quality provider, has a strong incentive to control any process and actor that may (negatively) influence the quality of the product sold under his brand. As I will show below, there are a number of governance mechanisms that can solve this safeguarding problem.

The third governance problem related to quality food transactions is the problem of coordinating interdependent activities. This governance problem is caused by information asymmetry and information incompleteness. Agricultural products, due to the vagaries of Mother Nature, are rather heterogeneous in quality. This is particularly a problem for a processor of agricultural products, as he has to transform a heterogeneous input of raw material into a uniform output of quality products. In addition, this raw material comes from many different producers. The processor has a problem of evaluating and assessing each supplier firm's separate contribution to the final quality or individual responsibility in case of food-related diseases. In fact, the processor has a double coordination problem. Besides the need to align his processing activities with the production activities of the farmers, he has to coordinate the production activities of many different and independent farmers. We may call this the vertical and horizontal coordination problems.

4.2. Governance solutions

Several governance mechanisms can be used to solve the problem of difficult performance measurement. One rather fundamental solution is vertical integration of the two formerly independent transaction partners. This is the solution suggested by Hennessy (1996), in his analysis of governance effects of measurement problems in food markets. This solution of bringing the transaction within the boundaries of

the firm provides the opportunity to apply behaviour-based governance mechanisms. Within firms there are more options for measuring activities of employees, revealing information, and preventing opportunistic behaviour. However, for many stages of the agrifood chain full vertical integration is not an option, because of scale effects, large distances, and incentive effects. In these situations, contracts may be a solution. For instance, under production contracts the need for measuring performance is greatly reduced because the processor puts restrictions on or even makes prescriptions for the type of seed and other inputs to be used, on harvesting time and method, and on cultivation practices such as irrigation and crop protection⁶⁷. In addition, specific incentives schemes are used to reward the farmer on the basis of objective quality measures. Besides these contractual and organisational governance mechanisms, social mechanisms may also reduce transaction costs. When farmers compete regularly in contract renewal they have an incentive to abstain from opportunistic behaviour as that would give them a bad reputation and endanger their potential to renew the contract. Here the reputation effect solves part of the governance problem.

Safeguarding specific investments can be obtained through full ownership integration. Again, other governance structures and mechanisms may also generate the required solutions. Raynaud *et al.* (2005) mention the following governance mechanisms that solve the asset specificity problem for a brand owner: long term contracts, renewable short-term contracts, and producer organisation. Long-term contracts provide room for incentive mechanisms such as joint goal setting, revenue sharing, internal conflict resolution, as well as for social mechanism such as informal information exchange, development of norms and routines, and trust. Renewable short-term contracts are for instance the production contracts mentioned above. The brand owner can go a step further in setting up a joint venture with its suppliers. By having a stake in the brand owner's profit, the suppliers will have less incentive to free ride. The option of setting up a producer organisation to safeguard investments in a brand will be discussed in Section 5.

Several governance mechanisms exist to solve the quality coordination problem. Quality grading and the creation of quality standards are examples of mechanisms implemented to reduce and manage quality uncertainty. A brand owner can go a step further and directly try to control critical steps of the production chain by contractually specifying restraints on its suppliers' behaviour. The governance problem of coordinating interdependent activities can be more easily solved through organisational mechanisms than through contractual mechanisms. Therefore, when quality is a crucial issue for firm performance, organisational or behaviour-based mechanism will be preferred above contractual mechanisms. In addition, social mechanism such as partner selection, reputation and trust play an important role in transactions with quality food products. In the next section I will argue that for simultaneously solving the problems of horizontal and vertical coordination, the PO holds an appropriate set of governance mechanisms.

⁶⁷ Bogetoft and Olesen (2002) give a number of examples of such contracts.

5. How can a PO support food quality?

The quality of the final food product is to a large extent determined by the first stages of the agrifood chain. This is obvious for agricultural products that are consumed fresh, such as fruits and vegetables. But also for products that require some kind of processing, the influence of the activities of producer and the first processor (as well as the logistics in between these two stages) on the final quality is crucial. Take for example the milk chain. The quality of the milk and derived dairy products is mainly determined by the activities of the farmer producing the raw milk and of the dairy company processing the milk into various dairy products. It is exactly in the first and second stages of the agrifood chain that POs concentrate their activities. In this section I will argue that a PO is an efficient governance structure for transactions with quality food products, as it reduces transaction costs in the producer - customer relationship. The role of the PO in supporting and guaranteeing food quality is related to the three governance functions distinguished above: safeguarding specific investments, solving performance measurement problems, and reducing coordination costs. This section discusses how the special organisational characteristics of the PO can support or hamper the development and guaranteeing of quality food products.

5.1. *Safeguarding specific investments*

A PO can safeguard specific investments in quality food products, particularly investments by the producers in improved quality products or innovative products. As these products will only be profitable when the marketing/processing firm gives the new products special treatment, there is the risk that the marketing/processing firm will behave opportunistic (by not giving the high quality products the special treatment that was agreed upon). When the marketing/processing firm is owned and controlled by the producers, this risk of opportunistic behaviour does not exist, because there is no conflict of interests between producers on the one hand and the marketing/processing firm on the other hand. Thus, the formal governance mechanism hierarchical control of the producers over the marketing/processing firm solves the transactional problem of safeguarding specific quality investments by the producers⁶⁸.

As discussed in Section 4, suppliers of quality food products often use a brand to distinguish themselves from generic (lower quality) products. This brand serves to reduce the information asymmetry between producer and consumer, so that the consumer is willing to pay a higher price for the branded quality product than for competing products. Establishing a brand requires substantial investments, the size of which is beyond the capabilities of the individual producer. Collectively, however, producers can establish a brand. In this case, the PO will establish and safeguard

⁶⁸ Staatz (1987) has argued that a cooperative may be in a better position—compared to an investor-owned firm—to introduce innovations that require adjustments at several levels of the production and distribution chain, because the common interests between cooperative and members lead to more easy decision-making and more efficient information exchange.

the brand. The relationship between producers and PO is like a long-term contract between the producers on the one hand and the brand owner on the other hand. Both parties have an interest in maintaining the value of the brand. As there is no conflict of interests between the producers and the PO, the problem of opportunistic behaviour by the producers *vis-à-vis* the brand owner does not exist. Thus, transaction costs due to the potential hold-up problem are low in the producer-PO relationship. The contract between producers and the PO contains obligations for the producers to deliver and for the PO to market all products delivered by the members. Verhaegen and Van Huylenbroeck (2002), in their study on governance structures for quality food chains in Belgium, found that the higher the investment in the brand, the more decision-making in the PO became centralised and the more behaviour-type of governance mechanisms were applied by the PO in its transactions with the producers.

The PO is also a suitable governance structure for marketing regional products, because the investments in the processing and marketing assets (including the brand) are specific to the regional producers. If the latter decide to stop supplying, the owner of the processing and marketing assets has no alternative source of products. Therefore, we may expect most brands of regional products to be in the hands of the regional producers. As the problem is not only one of transactional governance, but also of horizontal governance, a collective organisation like a PO is the appropriate governance structure.

5.2. Reduce uncertainty and improve performance measurement

A PO may be a solution to the uncertainty and difficult performance measurement problems in the producer–customer transaction. A PO combines contractual, organisational and social governance mechanisms. Because the producers are the owners of the PO, which means they receive the residual income, there are no conflicting interests between producers and their first customer (the PO). As producers and PO jointly decide on the quality of the product to be produced and processed/marketed, the transaction costs related to measuring compliance are low. Screening and selection costs will also be low as the PO has information on its members, which it has obtained both formally and informally (as the PO is also a community of producer-members). POs can use a combination of governance mechanisms to reduce uncertainty and improve performance measurement, both in the producer-customer transaction and further downstream in the supply chain. Take the example of a chain quality assurance system. Such a system only works well when firms at different stages of the agrifood chain comply with the quality requirements. When the PO governs the producer-customer transaction, already two participants in the chain are committed. The chances of free riding behaviour by the producers is low because they themselves, through their PO, have invested in this system and are the main beneficiaries of the system. Although the PO has no formal control over the producers, it often has the (delegated) authority to develop and monitor the requirements of the system, including the establishment of an obligatory code of practice for the producers. To put this argument more formally, producers individually have agreed to transfer the decision-

making rights regarding certain aspects of their activities to a collective body in order for this collective body to promote the joint interests of its members. In addition, POs often have quality grading systems to improve uniformity in products and to inform customers about the quality of the products they buy. As a representative of producers, a PO can guarantee a particular food quality to customers downstream in the chain. One of the important characteristics of a PO is the existence of informal governance mechanisms (or social capital). Because a PO is a voluntary, democratically-controlled organisation, social mechanisms like identity, trust, reputation, and social sanctions affect the incentives for producers to cheat on quality agreements. Being part of a social group reduces opportunistic behaviour *vis-à-vis* other members of the group as well as *vis-à-vis* the firm that is jointly owned by the group.

Slingerland and Díaz Gonzalez (2006) provide an example of a PO that helps producers not only to find a market but also to improve and maintain quality. The Asociación de Pequeños Productores de Talamanca (APPTA), in the Talamanca region of Costa Rica, was created in 1987 and has since played a key role in the growth of organic cacao and the access of small farmers to organic markets. One of the main tasks of APPTA was to choose a certification program together with its foreign customers and communicating the requirements to its members. In addition, APPTA set up and managed a monitoring system, with strong member participation in local committees. 'These committees have worked very well because other members of the community recognise their roles and their decisions are fully respected' (Slingerland and Díaz Gonzalez, 2006: 169).

5.3 Coordination

Coordination is needed both among the producers (in order to have them all produce the same quality) and between producers and customer (in order to align production and processing/marketing activities). Coordination is particularly needed when changes in the environment require simultaneous adaptation of production and processing/marketing activities. Having received certain decision-making rights regarding the activities of their members, the PO can apply organisational governance mechanisms to obtain the necessary coordination (Royer, 1995). As said above, coordination requires information exchange and decision-making. Information on consumer demands for food quality has to be passed on to producers, while information on the quality of the products has to be passed on to customers. The PO, being a central authority on behalf of the producers, can organise this information exchange. One means for a PO to solve the information asymmetry between producers and customers of quality food products is setting up a quality certificate program. This instrument of vertical coordination is more easily established by a PO than by a non-PO firm, because producers and PO do not have conflicting interests.

In fact, the governance structure PO holds a number of governance mechanisms to obtain coordination: contractual mechanisms like joint goal setting, jointly agreed rules and regulations, and incentives like prices; organisational mechanisms such as

standardisation, mutual adjustment and direct control of the PO over certain elements of the producer-customer transaction; and informal mechanisms such as restricted access (i.e. partner selection), shared norms and values, trust, and routines. Verhaegen and Van Huylenbroeck (2002) have found that producers of quality food products often set up a PO in order to coordinate both horizontally among the producers (to get homogeneous quality products) and vertically between producers and customers/consumers (to align supply and demand of high quality products).

Kambewa *et al.* (2006) give an example of vertical and horizontal coordination in the Nile perch chain from Lake Victoria (East Africa). Foreign customers aiming at improving corporate responsibility collaborate with local producer (fisherman) organisations in exchanging market information, and translating corporate responsibility demands into technical requirements for catching, storing and processing the fish. Whereas the sheer number of fishermen and traders in Lake Victoria may lead to problems in the coordination of both their activities and interests, efforts are undertaken to set up a PO to reduce transaction costs in dealing with individual fishermen. The PO will enhance the capability of primary producers to implement CSR programs, and will increase their awareness of the benefits of their involvement in these programs.

Most POs assist their members in adapting product quality to market needs, by providing extension services and a support structure to exchange experience and knowledge among members. The POs support members to make proper production choices (by setting requirements and providing technical support). The PO can guarantee homogeneous quality to its customers because producers collectively decide on the quality of their products, and because both contractual and social governance mechanisms support rule compliance.

The proposition that information is important for enhancing food quality was supported in a study on the role of producer organisations in improving the quality of mangos in Costa Rica. De Ruiter (2006) found, in an integrated food quality management study, that mango producers who are member of a mango marketing PO have more homogeneous information on proper mango quality (i.e. information on the quality demanded by foreign customers). He also found that the quality of the mango's produced by the members of the PO was higher and less variable than the quality of them mango's produced by non-members. Thus, by providing their members with the right information, the PO has a positive effect on food quality. Emongor *et al.* (2004), in their Zambia country study on small producer participation in restructured national and regional agrifood systems, provide several examples of POs providing training to their members in quality improvement and quality control. Besides strengthening the bargaining power of the producers, this extension function of the PO helps producers to better comply with the quality requirements of local and national (retail) customers.

6. Conclusions

In this paper I have argued that producer organisations (POs) are well suited to help improve product quality in agrifood supply chains. The argument starts from the idea, taken from new institutional economics, that all transactions are faced with transactions costs, and that differentiation in transaction costs leads to differentiation in the way transactions are governed (or organised). Transaction costs related to food quality are caused by three transactional problems. The problem of measuring performance is caused by a combination of conflicting interests and information asymmetry or information incompleteness. The problem of safeguarding investments is caused by a combination of conflicting interests, information asymmetry or information incompleteness, and transaction-specific investments. The problem of coordination costs rises in situations of common collaborative goals with information incompleteness or information asymmetry. New institutional economics suggests that particular governance structures can solve governance problems. However, this theory has three limitations. First, it uses a categorisation of governance structures that is too abstract to represent real-life organisational structures. Second, in seeking solutions for governance problems it only focuses on formal mechanisms, while informal (or social) mechanisms can play an important role in reducing transactions costs. Third, it emphasises conflicting interests, while transaction costs can also appear in situations where not cooperation (or motivation) is the main governance problem, but aligning (or coordinating) interdependent activities carried out by independent actors. In this paper I have developed a conceptual framework that addresses all three limitations. First, I focus on the underlying governance mechanisms instead of the governance structures. Each governance structure consists of a combination of governance mechanisms. Second, I include social mechanisms to solve governance problems. Third, I elaborate on the coordination problem, which also requires the application of various governance mechanisms to be solved. This conceptual framework has been applied, qualitatively, to the question how a producer organisation, as a specific governance structure combining various governance mechanisms, can enhance, maintain and control product quality in agrifood chains.

A PO can solve all three transactional problems as it has the ability to organise information exchange and as the economic and social commitment of the members to the PO reduces their inclination towards opportunistic behaviour. In other words, performance measurement problems and dependency relations due to specific investment will not be exploited by the producers nor by the PO because both formally (in ownership and contractual relations) and informally (being member of the social group) producers and PO are committed to each other. The coordination problem can be solved by transferring certain decision-rights from the individual producer to the PO. This central organisation will coordinate both horizontally among producers, in order to get a uniform quality, and vertically between producer and customer, in order to make sure that the demanded quality is also produced quality, as well as to obtain efficiency in logistics. The more important quality control is in the first stages of the chain, the more authority over this transaction should be delegated to the central organisation, the PO.

In this paper I have emphasised the functions of the PO in helping (smallholder) producers to develop, produce and sell quality food products. I have done so mainly from a theoretical perspective, thus ignoring the many challenges that producers and PO may encounter in real life, particularly in developing countries. These challenges relate to the difficulties in decision-making (e.g. nepotism by directors, lack of education by members, lack of democratic control mechanisms), to a lack of capital (because members do not have spare capital to invest in their PO), and to the need to combine economic, social and political functions (which reduces the efficiency and effectiveness of the PO in its economic functions). In addition, an unfavorable institutional environment may sometimes hamper the options for POs to set up quality assurance systems, to provide training for their members, and to focus on their economic tasks. However, the first step in supporting small farmers and their POs to enhance food quality is to clarify what the role of the PO can be, more particularly to show what governance mechanisms the PO can develop and apply to reduce transactions costs in quality food chains.

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Tropical food chains: issues, lessons and challenges

Ruerd Ruben, Aad van Tilburg, Jaques Trienekens and Martinus van Boekel

This book includes a collection of nine case-studies based on field research regarding governance and quality in (inter)national tropical food chains originating from different developing countries located in Africa, Latin America and Asia. They deal with the following tropical (and mostly vulnerable) commodities:

- fish originating from Kenya;
- cashew nuts processed in South India;
- pineapple produced in Côte d'Ivoire;
- cacao produced in Ghana;
- mango and pepper originating from Costa Rica;
- hogs and vegetables produced in China;
- milk produced in Ethiopia.

In addition, general issues related to the role of (horizontal) producer organisations (Verkerk *et al.*, this book) and the promotion of (vertical) supply chain quality control systems (Bijman, this book) provide a common background for the discussion regarding the linkages between governance regimes and quality management.

The different country and commodity studies offer a concise overview of some major opportunities and threats to tropical food supply chains as well as the internal strengths and weaknesses of different strategic options for integrating decisions and strategies with respect to channel choice, governance regime, quality performance and value-added distribution (as discussed in Ruben *et al.*, this book). Although it will be clear that the results of the studies in this book cannot immediately be up-scaled to tropical food chains in general, we expect that the lessons learnt from these studies will stimulate further research and as such contribute to general knowledge. In this final chapter, we attempt to put the results as presented in the preceding chapters in perspective by discussing the multiple dimensions of tropical food chain research, deriving some lessons learnt, and considering the challenges for further work in this area.

1. Multiple dimensions of tropical food chain research

All case studies focus on one or more of the key dimensions distinguished in the introductory chapter of this book (Ruben *et al.*): channel choice, governance regimes, quality performance and value added distribution. Reviewing these cases from this perspective, we can summarize the results as in Table 1.

It is interesting to note that all cases pay attention to interrelationships between governance regimes and quality performance, while far less or no attention is given to

Table 1. Interactions between key dimensions.

	Channel choice	Governance regimes	Quality performance	Value added distribution
Mango – Costa Rica	X	X	(X)	(X)
Pineapple – Ivory Coast	X	(X)	X	(X)
Vegetables - China		X	X	
Nile Perch – Kenya	X	X	X	X
Pork - China		X	X	(X)
Dairy – Ethiopia		X	X	
Pepper - Costa Rica		X	X	X
Cocoa – Ghana	(X)	X	X	
Cashew – India		X	X	
Chain quality control		(X)	X	
Producer organizations		X	X	

Note: X: main attention, (X): limited attention

the relationships between the two other dimensions of channel choice and value added distribution. In this section major interactions between the different dimensions will be described with examples derived from the preceding case studies. We explore what various cross-analyses of these focus areas in the preceding chapters have delivered in terms of new insights and challenges to be tackled in future research.

1.1. Interactions between governance regime and quality performance

As mentioned before, the focus in most of the chapters is on how governance regimes impact on quality performance in food chains in developing countries. We notice some interesting interactions between these two focus areas that can be illustrated from the case studies:

- *Vertical collaboration and quality performance.*
The case of Chinese pork processing industries shows that more integrated governance regimes (vertical integration or contract) are positively related to better quality management practices (management leadership, supplier quality management, product/ service design, process management).
- *Horizontal collaboration and quality performance.*
The study on Producer Organisations (Verkerk *et al.*, this book) describes how horizontal coordination helps to achieve uniform quality performance, e.g. by supporting members through quality programs and by providing members with quality demand information from the market.
- *Opportunism in buyer-seller relationships.*
The case on cashew in India illustrates how opportunistic behavior can negatively impact on quality and competitiveness. Both suppliers and buyers manipulate the

contracted quality such that short-term gains can be made. Weakly developed institutional structures with non-existent contract enforcement or sanction systems lead the sector in a vicious circle downwards.

- *Social capital to enhance quality performance.*
The Chinese vegetable chain shows positive relationships between social capital (through network relationships = *Guanxi*), trust and investments and perceived quality performance. Quality performance is positively influenced by stronger *Guanxi*, higher level of trust between buyers and sellers and relation specific investments.
- *The role of institutions.*
The important position of national institutions in international chain development is shown in the Ivorian pineapple case, where the export organisation OCAB supports collective action and stimulates uniform quality of products to be exported. On the other hand, the Ghanaian cocoa chain shows that national institutions such as the marketing board are rather constraining factors for quality improvements whilst here international business demands are in the forefront for quality enhancement.

In summary, many of the case studies indicate that bilateral governance regimes between supply chain agents are of critical importance for creating incentives towards improved quality management in tropical supply chains. In order to be able to perform this function, either internally agreed rules for contract enforcement or well-respected external authorities are required.

1.2. The impact of channel choice

Governance regimes, quality performance and value added distribution vary greatly amongst different types of marketing channels. Important issues related to marketing channel choice as found in the previous chapters refer to:

- *Market access.*
The export market of mango from Costa Rica is described as a specialized market where quality, price and location play an important role. Deliveries for the export market are guided by contract, strict quality control and plot supervision (including input provision and credit facilities). The local market is characterized by more flexibility in product administration and quality, where normally there are many buyers. The importance of the export market is also shown for local producers of pineapple in Ivory Coast and it is indicated how the export board OCAB plays a key role in the development of the right delivery regimes in these international chains. A basic condition in these chains is delivery according to international standards, implying compliance through quality certification.
- *Channel interaction and quality performance.*
The cocoa chain indicates how strong interactions between vertical chains (global governance) and local (horizontal) networks influence quality performance. In terms of process attributes the institutional reforms have opened some new possibilities. The entrance of international private and civil actors in the provision

of extension services has introduced (some) farmers to changes in demand and the increasing attention for the environmental and social conditions under which cocoa production is taking place.

- *Channel bottlenecks.*

A typical example of a channel bottleneck, preventing optimal use of resources and a smooth flow of products, is given in the Nile perch case. The output market of the fishermen is a typical example of an interlocked market where primary producers depend on traders for obtaining production facilities (boats and proper fishing gears) on credit, price information and product quality preserving facilities (e.g. ice).

In sum, channel choice is increasingly guided by demand side conditions, either related to specific segments of consumers and/or regulated through institutional regimes prevailing at input or output markets. Moreover, compliance with quality requirements and (inter)national grades and standards seems to be very much conditioned by improved provision of input and technical assistance services.

1.3. Impacts on value added distribution

Channel choice, governance structure and quality performance have a clear impact on the distribution of value added in the chain. Important issues discussed in this book are:

- *Quality (management) and value added (performance).*

In the analysis of the Chinese pork sector a positive relationship is found between quality management practices and firm performance (performance measured through variables customer satisfaction, growth rates, market share, and profitability. The case study on Chinese vegetables chain indicates a positive relation between quality and delivery compliance of farmers and firm profitability.

- *Position of small-holders and bargaining power.*

Smallholders involved in international food chains produce limited value added and have a weak position in value distribution. This is confirmed by most of the chapters in this book. However, several authors show cases where collaboration between small-holders may improve their bargaining power and thereby their position in the chain.

2. Lessons learnt

An important question is what can be learnt from the insights and experiences presented in this book. Therefore, this section discusses lessons learnt and to be learnt along the following four sub-questions:

1. Who will benefit most from chain integration?
2. What can public or private actors or agents contribute to the chain integration process?
3. What are the principal market institutions that need to be improved?

4. Can local and global action with respect to strengthening supply chain structure and performance reinforce each other?

2.1. Who will benefit most from chain integration?

The case studies included in this book present evidence for the statement that all chain partners may benefit from chain integration but notably primary producers (being farmers or fishermen) in developing countries. Benefits for the different channel partners (i.e. producers or processors) or customers that are registered refer to:

- Improved product quality or value for money for consumers.
- Improved countervailing power, price premiums for improved quality, higher income levels or improved income stability for primary producers.
- Improved food quality management and market knowledge for processors.
- Improved quality management and more competitive advantages for all channel members.
- Improved sustainability of resource use especially for upstream supply chain members.

These general statements can be substantiated by the following evidence. Typical examples of primary producers as potential beneficiaries of supply chain integration are:

- fishermen in Kenya because of the possibility that contracts cover sustainability of resource use;
- pepper producers in Costa Rica because of an increase in countervailing power through group action;
- pineapples produced in Côte d'Ivoire that realize an increase in competitiveness by means of product development through breeding;
- dairy farmers in Ethiopia by improved quality testing methods that enable quality gains.

Examples of processors as potential beneficiary are found in the hog meat processor in China by processing higher quality products. Final customers of the supply chain, the consumers, are also expected to benefit notably because of improved product quality and safety (e.g. fish from Kenya; hogs and vegetables in China) and better value for money (cashew nuts from India).

There is, however, one case study in which the primary producers tend to lose more than they gain because of a partial and consequently less effective implementation of national market liberalisation policies. This indicates that the distribution of benefits is not only an issue of bargaining relations between supply chain agents, but also depends on the global competitiveness conditions provided by the chain environment.

2.2. What can public or private agents contribute to the chain integration process?

The most cited stakeholder ‘institution’ that could contribute to the chain integration process in developing countries is notably weak or absent: ‘There is not such an institution at all’. This apparent weakness in the institutional environment of food supply chains tends to trigger stakeholders to solve the problems themselves. Typical remarks are: ‘We have to rely on our own creativity or experience’ or ‘We have to engage in network relationships based on mutual trust’. This can be illustrated with the cashew nut case (India) where mutual trust and contract enforcement among distant chain partners is a problem, and also with the pepper case (Costa Rica) and hog case (China) where farmers have to rely on their own creativity and power base.

Another type of (private) institutions contributing to supply chain integration consists of the requirement by buyers that quality assurance standards such as EurepGap, British Retail Consortium or the Ivory Coast Label (for pineapple) need be applied throughout the supply chain. Related to this is that large-scale retail chains or special interest groups in the western world impose their wishes on the suppliers of tropical food, not only in terms of quality standards, but also in terms of required sustainability of resource use, particular package type or size, and/or labelling (as shown in, e.g. the fish case from Kenya and the study on Chain quality control).

Given the notable absence of public enforcement agents in many developing countries, private institutions and arrangements tend to be of primary importance. Since smallholders face major constraints to comply with these more demanding grades and standards, local advisory or extension institutions involved in quality management issues or transaction costs reduction can be important to contribute to the chain integration process (as illustrated in the milk case from Ethiopia).

2.3. What are the principal market institutions that still need to be improved?

According to the presented case studies presented, the following improvements of market institutions can render new windows of opportunity for supply chain members:

- Appropriate alternatives for market or price coordination in the supply chain can be found in vertical coordination through contracts or network relationships (e.g. fish from Kenya, vegetables in China).
- When contracts form the ruling governance system for a particular commodity, an interesting option is to operate an efficient and effective arbitration system between contract partners that needs to cope with opportunistic behaviour of the contract partners (e.g. cashew nuts from India).
- Institution(s) can help to improve coordination between the functions of obtaining adequate market information and product development or breeding (e.g. pineapple in Ivory Coast, hogs in China).
- Adequate risk-management institutions are needed in several commodity supply chains (e.g. mango from Costa Rica).

- Institutions are required that promote or enforce the use of proper grading systems and the application of quality management and control systems (e.g. milk in Ethiopia).
- Collective action that stimulates or supports group action of primary producers to enhance their bargaining power is highly effective (e.g. pepper in Costa Rica).

In general, new market institutions that are able to reduce the risks and control the usually high transaction costs in developing countries' markets can substantially contribute to better and more balanced supply chain relationships. In addition, more than partial market liberalisation of the market institutions is required to increase the market opportunities and to reduce market entry costs for smallholder producers (as illustrated in the cocoa case from Ghana).

2.4. Can local and global action with respect to strengthening supply chain structure and performance reinforce each other?

The key question is whether particular local solutions for supply chain problems or constraints may have wider implications than only for the typical case study at hand. This concerns the issue of up-scaling. A related question is whether proven solutions elsewhere in the world can be applied to problems or constraints for case studies that have been discussed in this book. This is a matter of down-scaling. It is also possible that evidence derived from the case studies presented in this book and proven solutions for problems with supply chains elsewhere in the world reinforce each other in problem solving initiatives.

Possible relationships between local problems or solutions and global problems or solutions derived from the case studies included in this book refer to:

- Integration of primary producers in sustainable supply chains benefits all supply chain members, but especially those in the upstream part of the chain. This implies 'local action for global benefits'. Examples are found in the fish chain from Kenya, pepper in Costa Rica and vegetables in China.
- Contract enforcement is a key problem, especially in countries where the institutional environment has been weakly developed. Experience derived both from some of the case studies and from studies elsewhere (see Fafchamps, 2004) show that informal institutions - such as mutual trust, reputation or saving and credit groups - can substitute formal institutions to a certain extent. In this case, we can speak about a reinforcing effect of 'local action for global benefits' and 'global action for local benefits'. See, for example, the studies about fish from Kenya, cashew nuts from India as well as the studies on pork and vegetables in China.
- Consumer orientation in supply chains tends to have a positive effect on the activities and results of both product development and quality management. This is an example of 'global action for local benefits', as illustrated in the analysis on chain quality control regimes (Bijman, this book)
- Group action can enhance the bargaining power of small-scale primary producers within the supply chain (e.g. pepper in Costa Rica). An optimal group size in

terms of span of control and economies of scale is proved to be valid (e.g. milk in Ethiopia). Also, sustainable group action requires democratic leadership as argued in the study regarding the strategies for promoting producer organisations (Verkerk *et al.*, this book). These are typical examples of the reinforcing effect of 'local for global' and 'global for local'.

- Competition for produce of primary producers between export and domestic marketing channels and customer markets may benefit one type of customers, e.g. consumers in export markets, and harm another group, e.g. consumers in domestic markets ('local for global') as illustrated in the studies on fish from Kenya and mango from Costa Rica.
- Global experience with deregulation of public marketing institutions can benefit trade partners in a country where market institutions are not yet sufficiently deregulated. This is an example of 'global for local'. See also the cocoa case study from Ghana.

In sum, we can observe that different pathways for improved supply chain governance and integration can emerge, both originating from local or global incentives, while the major challenge tends to be an effective dovetailing of local and global action in order to reinforce incentive structure that simultaneously satisfy producers and consumers' interests. Such win-win options deserve major attention and are likely to be subject of future research.

3. Challenges ahead

We have seen that supply chains of many tropical commodities are facing multiple challenges in terms of market integration and quality upgrading. While economic reforms in developing countries may have reduced some binding constraints related to high transaction costs and overall competitiveness, still major limitations remain in the field of market transparency and trust relationships required to enhance better quality compliance and equitable revenue sharing (see Section 2.2).

Improving the performance of smallholder producers within tropical food chains requires new insights in the interactions between supply chain organisation and the techno-managerial options for enhancing long-term competitiveness. Different contributions included in this book emphasize the importance of improving access to information regarding the consumer's demand at different market channels. Dovetailing producers' interest with market demand asks for suitable incentives that satisfy the objectives perceived at both sides of the supply chain. Therefore, an integrated appraisal of effective governance structures which link stakeholders throughout the chain is considered of vital importance.

Within the four key areas that have been systematically addressed in this book (i.e. channel choice, supply chain governance, quality management and value added distribution) we can identify the following cross-cutting issues that influence the

structure and performance of (inter)national supply chains and networks of tropical foods and the position of smallholder producers therein.

3.1. Linking farmers to market channels

Market access is usually considered as a key constraint for smallholder participation in exchange networks. Originally, this was mainly related to limited infrastructure and scarce information that resulted in high transaction (especially entry) costs. In addition, the high risk related to deliveries to distant—and sometimes unknown—customers' preferences imply that high investments are required to guarantee competitiveness. Traditional traders play within this framework a critical role for providing pre-finance as an insurance device.

With the liberalisation of many local markets in developing countries, the position of smallholder producers generally hardly improved, since thin markets tend to meet limited agency competition. Moreover, local organisations that are in charge of resource pooling and promoting farmers' cooperation experienced serious drawbacks. When input provision and credit supply services became privatised, the opportunities for innovation and resource use intensification became more constrained. In such settings, global action may be beneficial to trigger local benefits (see Section 2.4).

Under the influence of increased urbanisation, smallholder participation in exchange networks is partly recovering through greater reliance on contractual deliveries to supermarket chains and (inter)national brokers (e.g. case studies on cocoa from Ghana and Nile perch from Kenya). This implies that farmers should be able to comply with new demands regarding product quality and safety (e.g. based on EurepGap regulations) and need to maintain stable and frequent deliveries. In several markets we notice the emergence of preferred supplier relationships where trust and cooperation are based on co-investment in quality upgrading. Elsewhere, new market opportunities are created that enable risk diversification (e.g. through engagement in future exchange). Finally, new local and regional initiatives for smallholder organisation arise in response to market demands for book and coordination (see the chapters on producers organisation and pepper from Costa Rica).

3.2. Supply chain governance for enhanced competition

Given the emerging new relationships between producers, traders/processors and retailers, the internal organisation of supply chain interactions is also subject to important modifications. New governance regimes are required to guarantee stable deliveries of high quality, while providing suitable incentives to all stakeholders and complying with established contractual arrangements.

Supply chain governance used to be focussed on establishing coordination regimes between supply chain actors mainly for efficiency purposes. In the current era of quality competition, other governance functions become increasingly important.

Searching for an incentive framework that enables specific investments in product and process upgrading occasionally implies that supply chain partners adopt common standards and certification procedures. This, in turn, gives rise to external economies that ask for collective action and farmers' organisation to control free-riding behaviour and enhance mutual control. Vertical supply chain integration might thus create new demands for strong horizontal organisation.

The new governance framework surrounding tropical food chains is based on a trilateral regime, where farmers and other chain partners engage in contractual market regulation and enhancing market competition. Several case studies included in this book clearly indicate that still an active role of the state is required to define minimum standards (at least for exports), but also to enhance market transparency in order to enable smallholder participation. Such a competitive local market environment will precisely provide suitable incentives for quality upgrading and efficiency improvement.

3.3. Contracting regimes for quality upgrading

Market competition at outlet level is increasingly determined by delivery frequency and quality performance. Where (inter)national trade networks used to be shaped by competitive advantage at country or enterprise level, competition is nowadays becoming more an issue of successful supply chain integration and quality management. Within such networks, incentives and information for enhancing the intensification of resources use are of critical importance for quality upgrading that translates into value added generation.

Long-term contracts that include facilities for input provision (e.g. seed, equipment), credit, and implements that enable upgrading of production systems and product management practices tend to be based on inter-linkages with traders and retailers that guarantee market outlets. Input, credit and information constraints can seriously reduce incentives for quality performance. Better security regarding market outlets and prices are for many smallholders a key condition for engaging in quality upgrading. External agents can contribute to market transparency by providing certification services.

Supply chains and networks of tropical food are generally characterised by heterogeneous products delivered by a diversity of producers to multiple local and (inter)national market channels. Heterogeneity in product quality can, however, also become an opportunity for smallholder development if a better match is made between the inherent variability at the supply side with different specific market segments. Optimising quality management throughout the supply chain implies that agents learn how to deal strategically with variability and risk (instead of only searching uniform quality) by obtaining timely insight in the sources of quality differentiation, thus enabling a pro-active management of variability and designing flexible systems that are tailored towards multiple market channels. The proposed procedure for

addressing critical quality control points (see Bijman, this book) might be useful to enhance this behaviour.

3.4. Organisation for bargaining power and value added sharing

Supply chain integration poses new challenges to collective action, both for enhancing economies of scale and scope in production, and for increasing bargaining options in market exchange (see Verkerk *et al.*, this book). Traditional reasons for agency organisation were mainly restricted to the farming domain, but these are now further extended towards other supply chain partners. This also implies that different forms and degrees of coordination—ranging from loose coupling to contracts—receive attention as vehicles for creating dynamic cooperative advantages. Supply chain coordination thus provides opportunities for improving management and investment intensity as basic pre-conditions for quality upgrading.

Successful agency cooperation critically depends on the availability of suitable incentives for enhancing investment efforts. Effective enforcement of delivery contracts and compliance with product specifications requires reward systems that recognize existing interdependencies. In addition, downstream agents may rely on group action—through cooperatives and other forms of producer organisations—in order to improve their bargaining power. Value added distribution in tropical fruit chains increasingly depends on effective channel coordination. While smallholders may have lost part of their traditional comparative advantage (mainly based on location), the emergence of new types of delivery relationships provides opportunities for creating specific skills and abilities that guarantee quality-based value added.

3.5. Agenda for further research

The different contributions included in this book are intended to increase our insights in institutional, technical and socio-economic factors that influence the performance of tropical supply chains. Further research on supply chain integration and management regarding tropical food chains has to face the following main challenges:

- Scientific support for improving the performance of tropical food chains will increasingly be based on the capacities to develop an integrated and interactive framework for the analysis of technical, institutional, managerial and knowledge factors that influence quality attributes at different stages of the supply chain. Dovetailing technical and socio-economic approaches to tropical chain management and governance is therefore required for adequately addressing the before-mentioned strategic interfaces.
- Strategic research focussing on the improvement of supply chain integration of tropical food networks asks for new instruments that need to be developed which enable the monitoring and prediction of quality change for particular market channels. Further research efforts should therefore be directed at the identification of appropriate techno-managerial and institutional innovations for managing product differentiation and channel choice.

- Supply chain performance analysis from an integrated perspective should simultaneously consider multiple performance indicators to assess the impact of these interventions and refer to their potential contributions to increased value added, income and employment creation, and risk reduction. Consequently, trade-offs between these different objectives can be specified and instruments and incentives for overcoming such constraints should be put in practice.

3.6. Policy implications

Most of the analytical work included in this book provides better insights in the techno-managerial conditions for enhancing smallholder participation in tropical food chains, improving supply chain governance regimes, upgrading quality performance and guaranteeing an equal distribution of value added. Although policy implications may not be derived directly from analytical research, some more general conclusions regarding policy support for establishing a suitable environment for supply chain integration and food production and delivery networks that serve the needs of all stakeholders are:

- Access of smallholders to tropical supply chains can be supported by reducing entry costs and through co-investment and insurance mechanisms that enable smallholders to undertake specific investments.
- The establishment of supply chain governance regimes asks for a legal and institutional framework that offers stakeholders equal opportunities for participation and exchange.
- With the increasing importance of grades and standards, public agencies should assume a leading role in enhancing market transparency, creating legal enforcement systems and guaranteeing compliance with minimum standards.
- The creation of dynamic comparative advantages based on supply chain cooperation needs to be supported by public research and development activities that provide sector-wide assistance to product and process upgrading.
- Improving bargaining options throughout the supply chain asks for public support for the establishment and training of local leadership and the promotion of community-wide voluntary organisations.

Many of these activities are likely to be based on close cooperation between public and private partners, and could be undertaken within the framework of public-private partnerships (sometimes supported by non-governmental organisations). Even while improving supply chain performance and governance is basically a private challenge, incentives provided by the economic and institutional setting can be helpful in overcoming critical constraints.

3.7. Afterthought

Working together with a group of almost 20 authors with the common objective of composing this collection of articles, proved to be a challenging adventure. Most of the work included in this book is based on field work embedded in doctoral thesis

projects or derived from collaborative research programs. Notwithstanding the diverse disciplinary background of each of the authors, some surprisingly similar results and common conclusions could be reached.

In conclusion, we find that four major experiences that emerged from this cross-sectional appraisal of tropical supply chains and networks deserve to be highlighted:

- Comparative studies of different case studies from a common perspective provide the required critical mass for drawing more generic conclusions regarding access, governance and quality management in tropical food chains.
- Even if there is no 'one size fits all' outcome that arises from these case studies, and consequently results cannot be easily used for up scaling, the nature and character of the interactions at the interfaces provide new insights in the options for addressing quality problems through interventions in governance.
- Almost all studies emphasize the importance of 'learning by doing' and the requirement of experiments for improving quality management and governance regimes.
- Improving supply chain performance is basically a matter of private sector interactions, but there remains certainly room for public involvement in standard setting, regulation and enforcement.

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About the authors

Richard Abila

Richard Oginga Abila holds a PhD in Fisheries Socio-economics from the University of Hull in the United Kingdom, a MSc. Degree in Agricultural Economics and a BSc. Degree in Agriculture from the University of Nairobi. He is currently Assistant Director of the Kenya Marine and Fisheries Research Institute and lectures part time at Maseno University in Kenya. Dr. Abila's research interest is on the social and economic aspects of small-scale fisheries in developing countries, with most of the research work conducted in Eastern Africa. He has published widely in his area of expertise, with over 40 publications either in refereed journals, book chapters, technical reports or international conference proceedings. Dr. Abila has worked on several consultancies or research projects for leading international institutions including FAO, World Bank, European Development Fund, USAID, NORAD and IUCN as well as for governmental and non-governmental institutions in Africa.

Contact: abilarichard@hotmail.com

Jos Bijman

Jos Bijman is assistant professor at the Management Studies Group of Wageningen University. Before joining the university, he worked as senior researcher at the Dutch Agricultural Economics Research Institute (LEI). At the university he lectures in economic organisation theory, project management and entrepreneurship. His research focusses on economic organisation issues in (international) agrifood supply chains. More particularly, his research is on the role of producer organisations in agrifood chains, organisational restructuring of cooperatives, internationalisation of cooperatives, and corporate governance in agricultural cooperatives. He published in the *American Journal of Agricultural Economics*, *European Review of Agricultural Economics* and the *Journal on Chain and Network Science*. He recently edited a book on *International agri-food supply chains and networks; management and organisation* (2006, Wageningen Academic Publishers).

Contact: jos.bijman@wur.nl

Marijke D'Haese

Marijke D'Haese joined the Development Economics Group of Wageningen University as assistant professor in November 2004. She previously worked at the Department of Agricultural Economics of Ghent University. She graduated from this university in 1997 as bio-engineer and received her PhD in 2003. Her research concentrates on economics of the agricultural sector in developing countries and in particular on institutional issues in farmer's access to markets such as contracts and group action or associations. Her research has been focussng mainly on Africa. Recently, she participated in research projects in Central America.

Contact: marijke.dhaese@wur.nl

About the authors

Gian Nicola Francesconi

Gian Nicola Francesconi graduated in Veterinary Medicine at the University of Pisa (Italy), with a thesis on neonatal livestock diseases (2002). After graduation he attended a course on rural development in tropical areas at the Scuola Superiore S. Anna of Pisa University. He developed a strong interest in the global food market and related topics. Next, he followed a one year Master degree program at the Scuola Superiore S. Anna on food quality and safety. He moved to Ethiopia to develop his master thesis (2003) under the supervision of Dr. Simeon Ehui and Dr. Azage Tegegne both from the International Livestock Research Institute (ILRI). His MSc thesis was on *The impact of dairy cooperatives on quality and safety of small farmers' milk*. During his stay in Ethiopia Gian Nicola he increased his interest in global food markets. His supervisors at ILRI brought supported him in contacting universities where he could obtain a PhD position. In 2004, Gian Nicola started a PhD program at the Development Economics Group of Wageningen University, under the supervision of Ruerd Ruben, Arie Kuyvenhoven and Martinus van Boekel. He was awarded with a grant by IFPRI (International Food Policy Research Institute) to conduct two years of field-work in Ethiopia, under the supervision of Dr. Eleni Gabre-Madhin. Gian Nicola expects to finish his PhD thesis in 2008.

Contact: G.Francesconi@cgiar.org

Jiqin Han

Jiqin Han is staff member of Nanjing Agricultural University in China. She has a Bachelor degree in Foreign Literature and Linguistics and a MSc degree in agricultural economics and management. In 2003, she was enrolled as PhD candidate at Wageningen University and her PhD research is about critical success factors for management in the Chinese pork supply chain. Her research interest is mainly on agri-food supply chain management. Since 2001, she has been involved in several international and national research projects on agribusiness management, especially with the governance structure of vegetable and meat supply chains. She participates in the EU-FP6 research project on 'Q-Porkchains' from January 2007 onwards. She published three papers in refereed scientific journals in China and contributed a chapter to a book on *International Agri-food Chains and Networks, Management and Organisation* (Wageningen Academic Publishers). In the summer of 2004, she lectured agri-food supply chain management in the EU Asian Link program 'Developing agribusiness training in the Mekong region' at Chiang Mai University of Thailand.

Contact: jhan@njau.edu.cn

Emma Kambewa

Emma Kambewa, PhD candidate in the Marketing and Consumer Behaviour Group of Wageningen University, obtained her BSc in Agriculture (1992) and her MSc degree in Agricultural Economics from the University of Malawi (1998). She joined Wageningen University in 2003 under a multidisciplinary research program on governance and quality in perishable product chains. The title of her PhD thesis (2007) is *Balancing the People, Profit and Planet Dimensions in International Marketing Chains: A study on coordinating mechanisms in the Nile perch channel from Lake Victoria*. It focuses on the question how international marketing channels can be organised such that small-scale primary producers from developing economies are integrated into international marketing channels in a way that adds to the profitability of both the chain members and the welfare of the local communities, without compromising the sustainability of natural resources. She presented papers at several international conferences, for example: *Stretching Corporate Social Responsibility Upstream: Improving Sustainability with Upstream Partners in Global Marketing Channels* (Conference on Corporate Responsibility and Global Business: Implications for Corporate and Marketing Strategy, London Business School, United Kingdom, July, 13-14, 2006). She contributed a chapter titled *Improving Quality and Ecological sustainability for Natural Resources in International Supply Chains: The Role of Market-Based Incentives*, in the book *Integrated Agri-food Chains and Networks; Management and Organisation* (Wageningen Academic Publishers, 333-342). Her research interests are in the area of marketing, channel governance, natural resources management notably in the context of small-scale producers in developing economies.

Contact: ekambewa@hotmail.com

Anna Laven

Anna Laven completed her MA in Political Science, with a specialisation in International Relations, at the University of Amsterdam (1996). She graduated from the Post-academic Course in European Environmental Management (EPCEM) with distinction (2001). Laven gained extensive field work experience during her studies in Bolivia and Peru where she studied how different stakeholders, involved in the mining and fishmeal sector respectively, cope with the increasing interest for 'sustainable commodities'. Currently, Laven is involved in PhD research at the Amsterdam Institute for Metropolitan and International Development Studies (AMIDSt). In her PhD study she focuses on the interaction between global chain governance and local level governance especially with respect to upgrading strategies for small-scale cocoa producers in Ghana. Apart from publications for a wider audience (a.o. *Bittersweet* on Africa TV, <http://www.africa-interactive.net/index.php?PageID=1570>), she recently published a chapter on *The Risky Business of Cocoa in Ghana: Local Entrepreneurs in a Buyer-Driven Chain* in the book *Business on the Rise: Conglomerates and Economic Groups in Developing Countries and Transition Economies Under Globalisation* (B. Hogenboom and A. E. F. Jilberto, eds., London: Routledge).

Contact: a.c.laven@uva.nl

About the authors

Anita Linnemann

Anita Linnemann is assistant professor in the Product Design and Quality Management Group of Wageningen University. In her MSc programme she combined tropical crop science and food technology with special reference to both food production and processing. She obtained her PhD degree also at Wageningen University (1994). Anita Linnemann teaches and conducts research on consumer-orientated design of food products, with a special focus on sustainability. Recently, she published *Consumer-driven food product development* in *Trends in Food Science and Technology* 17: 184-190. She also published in *Journal of the Science of Food and Agriculture*, *Food Quality and Preference*, *Critical Reviews in Food Science and Nutrition*, *Journal of Agricultural Science*, *Field Crops Research* and *Annals of Botany*. Anita Linnemann is member of the scientific validation committee of 'Milieu Centraal', the national governmental organisation for practical and reliable consumer information on environment-friendly lifestyle issues.

Contact: anita.linnemann@wur.nl

Hualiang Lu

Hualiang Lu studied Agricultural Economics and Management (BSc, 1996) at Nanjing Agricultural University. From 1996 to 2001, he worked as a government official on issues related to agricultural production and rural development in Jiangsu Agricultural Department. His MSc degree is from Wageningen University with a specialisation in Agricultural Economics and Management (2003). Hereafter, he became PhD. researcher at the Management Studies Group of Wageningen University. His research subject is Globalisation, Food Quality and Sustainable Agro-Business Chains: *Guanxi* networks, buyer-seller relationships and chain performances. It deals with the vegetable sector in Jiangsu province, China. Hualiang Lu's research interests focus on (inter)national agrifood chains, on relationships (*guanxi*) and trust in these chains and on chain performance measurement. He presented papers at various international conferences and contributed to book chapters and international journals. He is member of IAAE, EAAE and IAMA.

Contact: hualiang.lu@wur.nl

Onno Omta

Onno Omta is professor in Business Administration at Wageningen University and Editor-in-Chief of the *The Journal on Chain and Network Science*. He graduated in biochemistry and defended his PhD thesis on the management of biomedical research and pharmaceutical innovation at the University of Groningen. He is author of many articles on innovation management and the author of several books in this area. He has been active as a management consultant for a variety of (multinational) companies in the area of innovation management. His current research interest encompasses innovation in chains and networks in the agri-food industry.

Contact: onno.omta@wur.nl

Ruerd Ruben

Ruerd Ruben is professor in Development Studies and director of the Centre for International Development Issues Nijmegen (CIDIN) at the Radboud University Nijmegen. He received a PhD at Vrije Universiteit Amsterdam on a study about farmers' cooperative organisation. Prof. Ruben worked extensively on issues of land reform and rural development in several Central American countries (Nicaragua, Costa Rica, Honduras), on policies for sustainable land use in East and West Africa (Mali, Burkina Faso, Ethiopia, Kenya) and on tropical supply chain integration in China, Costa Rica and Ethiopia. He has published in journals like *Agricultural Economics*, *Food Policy*, *Ecological Economics*, *Journal of Agrarian Change*, *Agricultural Systems*, *Supply Chain Management* and the *Journal on Chain and Network Science*. Edited books appeared with MacMillan, Kluwer Academic Publishers, Springer Verlag and CAB International. Ruerd Ruben is associate researcher with the International Food Policy Research Institute (IFPRI) at Washington D.C., chair of the board of Agrofair Assistance and Development Foundation and advisor for several (inter)national development organisations.

Contact: r.ruben@maw.ru.nl

Rob Schipper

Rob Schipper graduated from Wageningen Agricultural University in development economics (1976). He worked in Peru for the Netherlands Development Cooperation and in Panama, Italy and Nepal for the FAO. He joined Wageningen University to work on regional agricultural development research in Sri Lanka (1981). From 1983 onwards he is a lecturer in the Development Economics Group. He obtained his PhD degree with a thesis on the economics of land use, based on research in Costa Rica (Wageningen University, 1996). Currently, his research interests are directed to: (a) Methodological issues of interdisciplinary, multilevel analysis of rural development; and (b) Economic and agricultural policies to further sustainable use of natural resources by (farm) households. He is teaching on subjects such as spatial and regional economics, rural economic analysis, cost-benefit analysis, environmental valuation, development economics, data analysis for field research and quantitative analysis of land use systems. He participated in short-term missions to Uruguay, Chile, Ethiopia, Kenya, Costa Rica, Indonesia, Burkina Faso, Honduras, Guatemala and Mexico.

Contact: rob.schipper@wur.nl

About the authors

Nienke Tander

Nienke Tander (1975) is a PhD-candidate at the department Rural Development Sociology of Wageningen University. Her research focuses on the way in which quality standards are put into practice and how this affects access to markets. Her case regards cashew nut production, processing and trade. Her field research was both in Kerala (India) and in the Netherlands. Research for her MSc theses has been carried out in Mongolia (1997), focusing on strategies of nomadic herders after privatisation and in Bhutan (1999) focusing on the introduction of cash-crops and production and marketing strategies of farmers.

Contact: nienke.tander@wur.nl

Tan Tao

Tan Tao received his MSc degree in environmental engineering from Nanjing Agricultural University (China) in 1998. His PhD thesis (NAU, 2004) was in agricultural economics and management. He became a lecturer in the College of Public Administration and his research interests include agri-food supply chain management and protection of agricultural intellectual property rights. He published about 10 papers in several journals in China, such as *China Rural Economy*. Topics of his papers cover organisational efficiency of vegetable supply chains, comparative research of the new plant variety protection systems in China, Japan and Korea, and the impact of variety protection in the garlic industry in China. He is currently involved in research projects on farmers' coordination in vegetable production, and electronic solutions to quality management problems in agri-food supply chains.

Contact: tantao@njau.edu.cn

Jacques Trienekens

Jacques H. Trienekens obtained a PhD degree in food chain management at Wageningen University (1999). He is associate professor at the Management Studies Group of the same university. He is editor and associate editor of *Journal on Chain and Network Science* and *International Food and Agribusiness Management Review*, respectively. He published in a variety of international journals such as *International Journal for Production Economics*, *Production Planning and Control*, *Computers in Industry*, *Food and Agribusiness Management Review*, and the *Journal on Chain and Network Science*. He has extensive experience in international research programs and is director of Wageningen Expertise Centre for Chain and Network Studies. This expertise centre bundles research and education on food supply chains and networks within Wageningen University and Research Centre.

Contact: jacques.trienekens@wur.nl

Martinus van Boekel

Martinus van Boekel completed his BSc. (1975), MSc. (1977) and PhD (1980) in Food Science and Technology at Wageningen University. He was a food chemist at the Food Inspection Service, Rotterdam (1980-1982). At Wageningen University he was assistant professor in Dairy Technology (1982-1994), associate professor in Integrated Food Technology (1994-2001), full Professor and head of the Product Design and Quality Management Group (2001-present). He is also director of the Graduate School VLAG on Food, Nutrition, Health and Agro-technology. He authored and co-authored about 130 refereed scientific papers and 4 books. The courses in which he and his group members are teaching can be characterised by an integrated approach to food quality. This is done by integrating food technology, consumer sciences, quality management and food supply chain analysis. The research activities of the group include modelling as a tool to integrate food quality, studied from a consumer perspective, with other (sub-)sciences. The food quality management approach integrates food science and management in a so-called 'techno-managerial approach'.

Contact: Tiny.vanBoekel@wur.nl

Aad van Tilburg

Aad van Tilburg graduated in econometrics from Erasmus University Rotterdam (1971). He joined Wageningen University in 1974 where he is associate professor in marketing. His PhD thesis was on consumer choice of cut flowers and pot plants (1984). His research interests cover several topics in marketing and agricultural marketing, notably the performance of markets, marketing channels and supply chains of grains and perishable products both within tropical countries and at an international scale. He published in *Agribusiness*, *Agricultural Economics*, *European Review of Agricultural Economics*, *Journal of Development Economics*, *Journal of Regional Science*, *Journal of African Economies* and the *Netherlands Journal of Agricultural Science*. He was co-editor of several books including *Agricultural Marketing and Consumer Behavior in a Changing World* (1997, Kluwer Academic Publishers), *Agricultural Marketing in Tropical Africa* (1999, Ashgate Publishing), *Agricultural Markets beyond Liberalisation* (2000, Kluwer Academic Publishers) and *Marketing tussen Wetenschap en Maatschappij* (2006, Wageningen Academic Publishers).

Contact: aad.vantilburg@wur.nl

About the authors

Ruud Verkerk

Ruud Verkerk (1964) is assistant professor in the Product Design and Quality Management Group of Wageningen University. From 1988 to 1997 he worked at the same university as research assistant in the department of Molecular Biology on 'Genome organisation of the tomato' and later he joined the department of Food Technology to work on 'Integrated food science'. In 1997 he became researcher in the EU-programme 'Effects of food-borne glucosinolates on human health'. Ruud Verkerk got his PhD degree in 2002 from Wageningen University on the subject *Evaluation of glucosinolate levels throughout the production chain of Brassica vegetables - towards a novel predictive modeling approach*. From 2001 to 2006 he worked as post-doc in several projects and conducted research on product quality in international food supply chains. His research interest focuses on consumer-oriented quality attributes of agro-food products in both national and international supply chains. He developed a special interest in supply chain effects on bioactive secondary plant metabolites with specific attention to processing.

Contact: ruud.verkerk@wur.nl

Sabine Willems

Sabine Willems received a PhD degree from Wageningen University (2006) with a study on the social and economic effects of global marketing of fresh agricultural products cultivated in developing countries. Over the past 10 years, she obtained working experience in various positions and projects in Africa, the Middle East and Eastern and Western Europe. She presently runs her own consultancy firm 'AgriGlobe', which specialises in international supply chain and agri-business development, public-private partnerships, and food safety and quality in developing countries and emerging economies.

Contact: sabinewillems@planet.nl

Guillermo Zúñiga-Arias

Guillermo Zúñiga-Arias joined the Universidad Nacional in Costa Rica and in 2000 he obtained his B.Sc degree in Social and Economical Planning. He obtained his M.B.A. degree in 2002 with emphasis on Marketing. In 2003, he enrolled in a PhD programme of the Development Economic Group at Wageningen University. He focuses his PhD study on the analysis of the mango supply chain from Costa Rica to customers elsewhere and he has a special interest in the role of smallholders. Special attention is given to market selection in both local and export markets, bargaining power of chain agents, value added distribution and quality management throughout the chain. He uses economic tools, laboratory analysis of fruits and gaming simulation as tools of analysis. He plans to finish his research in 2007.

Contact: guillermo.zuniga@wur.nl

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