

CHAPTER 1

AGRO-FOOD CHAINS AND NETWORKS FOR DEVELOPMENT

Issues, approaches and strategies

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Abstract. Agro-food chains and networks play an increasingly important role in providing access to markets for producers in developing countries. Globalization of trade and integration of supply chains lead to new demands regarding food quality and safety. Analytical approaches for addressing the role of trade for development involve a mixture of disciplines that focus on issues of efficiency, organization and innovation as key dimensions of competitiveness. Smallholder participation in global supply chains is critically determined by three processes: market access, network governance and chain upgrading. Public and voluntary agencies may provide important contributions for reinforcing the supply-chain environment.

Keywords: globalization; international trade; supply-chain integration; network cooperation

INTRODUCTION

Globalization, urbanization and agro-industrialization put increasing demands on the organization of agro-food chains and networks. Food and agribusiness supply chains and networks – once characterized by autonomy and independence of actors – are now swiftly moving toward globally interconnected systems with a large variety of complex relationships. This is also affecting the ways food is produced, processed and delivered at the market (Reardon and Barrett 2000; Van der Laan et al. 1999). Perishable food products can nowadays be shipped from halfway around the world at fairly competitive prices. The market exerts a dual pressure on agro-food chains, forcing towards continuous innovation and agency coordination. Classical price and quality issues are more important than ever, since consumers can choose from an increasing number of products offered by competing chains.

The increasing integration of local and cross-border agro-food chains can be considered both a threat and a challenge for rural development. Poor farmers in developing countries who have limited resources and scarce access to markets and

R. Ruben, M. Slingerland and H. Nijhoff (eds.), Agro-food chains and networks for development, 1-25.

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information meet major constraints for the adoption of technological innovations and may therefore be excluded from trade. Economies of scale in processing, transport and distribution also lead to demands for growing volumes of commercial agricultural production and stable delivery capacities of homogeneous quality. Otherwise, smallholder production could offer cost advantages for the delivery of labour-intensive commodities that require strong quality supervision. Involving family farmers into global agro-food chains would also be a suitable device for ensuring a more equitable distribution of the value-added. Bridging the gaps between local economic development and global chain integration asks for the emergence of new institutional and organizational networks that enable producers in developing countries to meet business requirements and trade standards. It also requires a fundamental reorganization of information streams and agency relationships, providing opportunities to smallholders to adjust their supply to consumers' demands and to become a recognizable part of global sourcing regimes.

In this introduction we synthesize main issues at stake in the debate on the role of agro-food chains and networks as instruments for development. First, we summarize the implication of globalization and market liberalization for the organization of local and global food chains. Thereafter, we outline the main principles and approaches that motivate a paradigm shift towards more integrated and interdisciplinary agro-food chain and network analysis. This is followed by a discussion on the institutional aspects of chain and network cooperation. Next we identify the necessary conditions for successful and equitable integration of developing countries' producers into sustainable agro-food chains and networks. We conclude with some implications for policy support to foster entrepreneurship, co-innovation and cooperation between local producers' networks and (inter)national agro-food business companies.

GLOBALIZATION AND INTEGRATION OF AGRO-FOOD CHAINS

Food and agribusiness chains are greatly affected by consumers' concerns regarding food quality and safety and the sustainability of food production and handling methods. Societal concerns regarding GMOs, chemical residues and environmental impact have to be met in a competitive, increasingly global environment. Higher consumer demands regarding the quality, traceability and environmental friendliness of products and processes call for fundamentally new ways of developing, producing and marketing products (Humphrey and Oetero 2000; Omta et al. 2001). This triggers the development of grades and standards and agreements regarding good production and management practices, as well as adequate monitoring systems to guarantee prompt responses and quality compliance. Integrated production, logistics and information and innovation systems become of critical importance for maintaining a competitive market position. In order to achieve international collaboration between farmers, agro-industries and retail companies, strategic and cross-cultural alignment, relational trust and compliance to national and international regulations have become key issues. Mutual learning procedures and feed-back mechanisms are important to guarantee such global alliances.

In recent decades, the world has witnessed an increasing integration of developing-country firms into geographically dispersed supply networks or commodity chains. These chains link together producers, traders and processors from developing countries with retailers and consumers in urban centres and in the developed countries (Gereffi and Korzeniewicz 1994). Firms and companies involved in global food and agribusiness chains and networks are facing fast changes in the business environment, to which they must respond through continuous innovation. New procedures and practices for organizing food supply networks – with direct ties between primary producers, processors and retailers – emerged to cope with food safety and health demands. Optimizing the individual stages in a chain usually results in sub-optimal overall chain performance. For this reason, agro-food companies try to enforce regulations to all actors in the chain that become part of the global market and institutional environment (Jongen 2000; Van der Laan et al. 1999). Firms in developing countries face, however, specific constraints related to limited access to (technical and market) information and reduced borrowing opportunities (Harris-White 1999). Chain integration can then be helpful to improve prospects for sustainable resource management based on more stable access to markets and information that enable additional investment in food quality management (Kuyvenhoven and Bigman 2001).

Recent studies regarding trade and development focus attention on emerging barriers to agricultural exports from developing countries due to stringent sanitary and phytosanitary requirements (Henson and Loader 2001; Otsuki et al. 2001). Liberalization of global trade is increasingly accompanied by technical measures that impose quality standards regarding residues, additives and microbiological contamination. In addition, rapid concentration takes place in the retail sectors for food products – both in developed and less-developed countries – where US- or EU-owned supermarket chains (e.g., Royal Ahold, Carrefour, Tesco, Sainsbury's, WalMart) control an increasing share of food supply to urban consumers. Retailers are also devoting more shelf space to convenient high-quality fresh products (self-service) that are crucial to attract and retain middle-class customers (Fearne and Hughes 1998; Marsden and Wrigley 1996). This poses additional demands on producers and processors to satisfy high and uniform quality standards and frequent delivery requirements (Reardon et al. 1999). International sourcing of perishable products to secure year-around supply (under private label) can be guaranteed through partnerships and long-term contracts. Inclusion of smallholders from developing countries into global supply chains that satisfy these conditions used to be based on procedures for outsourcing and sub-contracting under strict surveillance with frequent audit of local facilities and practices (Dolan et al. 1999). In practice, however, an increasing degree of vertical integration within food and agribusiness networks can be noticed, based on complex contractual arrangements for monitoring product quality and process standards. Consequently, producers can only maintain their market position if credible measures are taken to enhance product quality and safety.

The complex linkages between the before-mentioned processes of market integration and globalization, accompanied by tendencies of growing urbanization and changing consumption patterns, bring about a number of fundamental changes

in the organization of agro-food chains and networks. The rapid growth of supermarkets (see Box 1) in both developed and developing countries deeply transforms the institutional landscape of agro-food production and exchange systems. Major challenges as how to guarantee the involvement of smallholder producers in these new and more demanding sourcing networks need to be addressed. Attention should also be given to the institutional requirements that enable smallholders to meet the more stringent food safety and quality regulations. International competition is increasingly taking place around the enforcement of (public and private) regimes of grades and standards. Putting the principles of chain reversal in practice implies that innovative approaches are required that address the necessary conditions for successful and equitable integration of developing countries' producers into sustainable agro-food chains and networks that are capable to satisfy these changing consumer demands.

Box 1. The rapid rise of supermarkets in developing countries

Consumers in developing countries purchase an increasing share of their daily food through supermarket chains. Retail sales of fresh products already represent 2-3 times the size of agricultural exports. The supermarket share in food retail is estimated between 40 and 70% in Latin America and Asia and 10-25% in Africa, and increasingly involves middle- and working-class segments of the population in (peri-)urban and even rural regions.

Supermarket procurement regimes for sourcing of fruits, vegetables, dairy and meat strongly influence the organization of the supply chain. The market requires product homogeneity, continuous deliveries, quality upgrading and stable shelf life. Procurement reliance on wholesale markets is rapidly replaced by specialized wholesales, subcontracting with preferred suppliers and consolidated purchase in regional warehouses. Supermarkets thus increasingly control downstream segments of the chain through contracts, private standards and sourcing networks.

Source: Reardon and Timmer (in press)

TRADE AND DEVELOPMENT: TOWARDS A NEW PARADIGM

Early studies on the role of international trade for development have focused on cross-country assessments of the terms of trade and provide recommendations to public agencies regarding appropriate exchange-rate regimes and conducive monetary policies (Krueger et al. 1988). In a similar vein, economic integration has been envisaged from the perspective of creating free-trade zones amongst neighbouring countries. The competitive advantage of most developing nations was considered to be based on their natural resource endowments (i.e., favourable climate conditions for growing tropical crops) and their low relative land and labour costs. Foreign direct investments are mainly channelled towards those developing

countries that maintain stable economic performance, provide a reliable legal and fiscal framework, and possess adequate infrastructure facilities.

Porter's (1990) seminal study on the 'Competitive Advantage of Nations' marks a shift in the analysis of trade and economic development, focusing attention at the competition and cooperation among enterprises instead of countries. In his view, competition increasingly takes place between firms and amongst supply chains that try to improve their position through systems upgrading and superior management regimes. This has far-reaching implications for development studies, since more attention should be given to the interfaces and linkages between farms and firms. Private-sector-oriented marketing studies and agribusiness analyses thus conquered a new space in the development arena (Cook and Chaddad 2000).

Research on marketing of smallholder crops in developing countries has traditionally been strongly supply-driven, focusing attention on 'finding market outlets' (Scott 1995) while paying scarce attention to consumers' demands. Most early studies on international trade refer to coarse grains and staples and focus on the efficiency of traders and collectors networks. Chain cooperation was usually limited to the delivery contracts, considering external relations within the framework of interlocked transactions and sub-contracting arrangements (Glover 1990; Key and Runsten 1999). Integrated analyses of international commodity chains have focused on long chains with considerable value-added in transport and processing (e.g., coffee, cotton, sugar, bananas; see Vellema and Boselie 2003; Dorward et al. 1998; Van der Laan et al. 1999). Some studies on fair trade and ecologically produced commodities are confined to particular market niches (e.g., FLO and IFOAM certification).

On the other end, agribusiness analyses usually devote limited attention to the existing trade-offs between consumers' food demands and producers' welfare. Spot-market exchange or loose delivery contracts are not able to bridge this gap. Given the increasing globalization of transactions in fresh products, new market institutions emerge that better respond to the dynamics of agro-food systems. Promising analytical frameworks making use of agency theory and contract choice simulation have recently become available that permit to identify potential win-win scenarios. Improved integration of global commodity chains is increasingly considered a suitable strategy for enhancing food quality and sustainable resource management practices at different scale levels. Under conditions of market liberalization, contractual relations may offer alternatives for simultaneously enhancing food safety standards and reducing risks (Van Tilburg and Moll 2000).

New concepts

Supply-chain analyses make use of a range of concepts to identify critical aspects of market structure and performance. *Supply chains* are understood as transformation processes from inputs through primary production, processing and marketing to the final consumer (Porter 1990). They involve three key dimensions: (a) organizational systems for the coordination amongst agents; (b) knowledge systems for combining information, skills and technologies; and (c) economic mechanisms for product and

technology selection and for providing market access. Supply chain performance can be assessed with efficiency parameters, searching for specialization according to comparative advantage and towards integration for reducing transaction costs.

Additional performance indicators (Beers 2001) are in the domain of consumer value (e.g., perceived quality) and impact on society (e.g., side effects on environment and health).

The French '*filière*' (or sub-sector) approach – defined as a system of agents for producing and distributing goods and services – provides insight into the sequential nature of interconnected activities through the spatial mapping of commodity flows. Main attention is given to the empirical assessment of input–output relations, prices and value-added distribution along commodity chains (Raikes et al. 2000). Commodity systems are mostly analysed from a rather linear technical and managerial perspective and *filière* analyses have been widely used to justify commodity price stabilization regimes.

Value chains focus attention on the distribution of value-added throughout the supply chain amongst different agents (Gereffi and Korzeniewicz 1994; Gereffi et al. 2002). This analysis devotes special attention to the cost structure of production, processing, transport and retail, the opportunities for reaching economies of scale and scope, and the available surplus that accrues to each of the chain partners. This value distribution is subject to bargaining amongst the chain partners and will be modified when increasing interdependencies give rise to changing perceptions of risk and efforts. Analyses of global commodity chains devote particular attention to the governance dimension of trade networks, the existence of entry barriers and the economic and spatial division of labour.

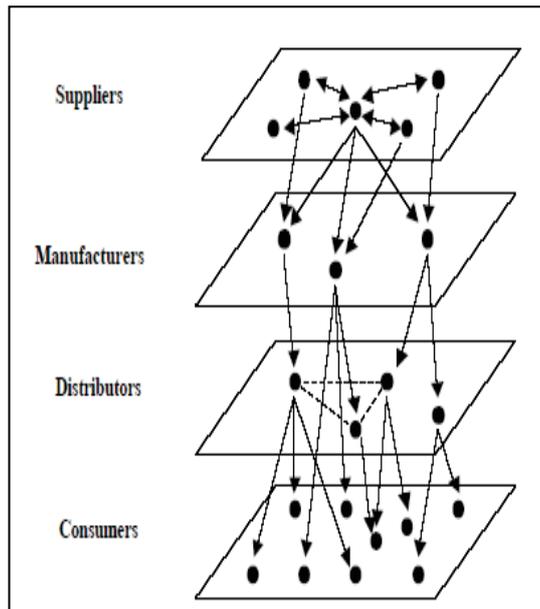
Relations between partners involved in the supply chain can be analysed with different concepts. Spatial cooperation has been addressed through *clusters* that consist of a geographical concentration of interconnected activities with strong vertical linkages in order to reinforce competitiveness (Porter 1998). The advantages of clusters involve economies of scale and scope, providing opportunities for flexible specialization to reduce technological discontinuities, and agglomeration effects that permit lower transaction costs. Clusters thus create external economies (i.e., labour and input exchange; joint learning; reduced transport costs) and reinforce collective efficiency through collective action in areas of mutual interest.

In a similar vein, *networks* are envisaged as horizontally structured relationships between agents that enable a reduction of transaction costs for coordination and information exchange. Agency coordination permits the creation of scale economies for input purchase and marketing, complementarities in the division of tasks, and network externalities (Hayami and Otsuka 1993). Taking advantages of the existing diversity in resources and capacities, networks based on pooled interdependence can thus reinforce the bargaining position of agents within the chain.

Recently, Lazzarini et al. (2001) launched the concept of *netchains* at the interface of vertical supply chains and horizontal networks. Netchains can be conceptualized as a multi-layer hierarchy between suppliers, processors and retailers where horizontal coordination between reciprocal agents is embedded in a framework of vertical deliveries (see Box 2). Horizontal cooperation (e.g., in

farmers cooperatives) may be better able to cope with the stringent quality criteria and changing quantity demands emerging from chain partners.

Box 2. Example of a netchain structure



Netchains provide linkages between horizontal networks of suppliers and vertical supply chains. They involve different types of (nested) interdependencies amongst agents, like: (a) reciprocal cooperation based on mutual exchange between suppliers; (b) sequential delivery systems based on planning along the supply chain; and (c) pooled interdependencies at business level to guarantee standardization and harmonization of processes.

Source: Lazzarini et al. (2001)

Finally, *contracts* play a critical role in the relationships between chain and networks partners. They define the rules and obligations for establishing cooperation, both between network partners and chain agents. When repeated transactions take place, contracts represent a cost-reducing device. For deliveries that involve high-quality demands, self-enforcing contracts that involve trust and loyalty are preferred to reduce monitoring costs. Different options for integrating (horizontal) networks and (vertical) chain contracts are available for guaranteeing risk-sharing and ensuring trust relationships. Given the high risks and the difficulties of monitoring numerous heterogeneous agents, entire-channel process control is increasingly preferred (Van der Laan 1993; Janssen and Van Tilburg 1997).

INTERDISCIPLINARY PERSPECTIVES ON AGRO-FOOD CHAINS

Supply-chain analysis is becoming an interdisciplinary activity. Production and distribution processes involve a mixture of socioeconomic, technological, legal and environmental criteria that are highly complementary in explaining overall agro-food chain performance (see Figure 1).

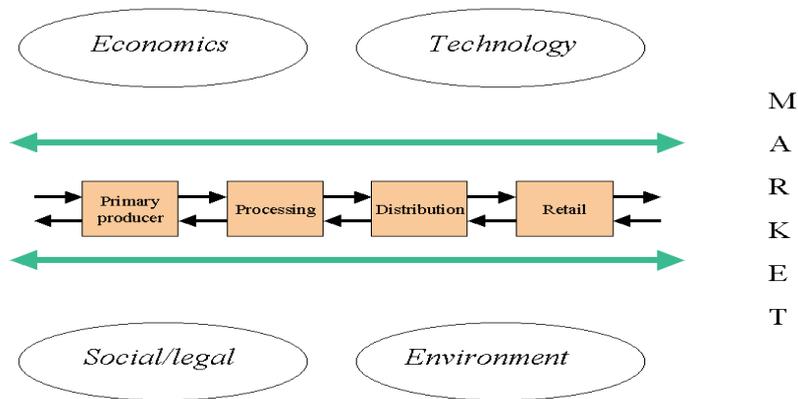


Figure 1. Analytical perspectives on food chains

The performance of the entire food chain ‘*from farm to fork*’ is shaped by four different dimensions (Trienekens 1999):

- Economic dimension, related to chain efficiency (in a cost–benefit perspective) and consumer orientation. To increase efficiency and profitability, individual companies may establish alliances with other parties in the production column resulting in supply chains and networks. Such ‘*netchains*’ offer better prospects that production and distribution systems comply with consumer values, enable the establishment of integrated quality and safety control systems, and might enhance the external competitiveness of businesses.
- Environmental dimension, referring to the way production, trade and distribution of food is embedded in its (ecological) environment. Important performance issues are related to the use of energy and to energy emissions in production and distribution of food products, the recycling of waste and packaging materials throughout supply chains, and the prospects for sustainable food production systems (including attention for issues like biodiversity and landscape architecture).
- Technological dimension, related to the application of (product and process) technology, logistical systems, and information and communication technologies that improve quality performance and enhance innovation in food products. Important issues at stake refer to systems for guiding and controlling processes and flows of goods throughout the supply chain (e.g. HACCP, tracking and tracing) and the development of new products supported by (private) standards.
- Legal and social dimension, i.e. the norms and values related to societal constraints to production, distribution and trade of food, concerning criteria of human well-being, animal welfare and sustainable entrepreneurship. Important issues at stake refer to legislation and agreed business practices (in platforms and conventions) regarding food products, compliance with corporate social

responsibility (People–Planet–Profit), and the (inter)national legal and regulatory framework.

Central aspects influencing the performance of food supply chains are usually found at the interface of private and public action. Consumer expectations and demands regarding food quality and safety can be addressed through technological optimization (e.g., improved integration of production and distribution systems to reduce delivery times and improve shelf life), with specific management practices (brands, informational labelling, etc.) accompanied by suitable monitoring and control systems (traceability), and/or by imposing legal standards. Similarly, the sustainability of food chains can be enhanced through technical interventions (improved seeds, biodiversity management, waste disposal), with private economic measures (environmental labelling, differentiating food products complying with particular health and safety standards), within the framework of (inter)national legal standards and socio-cultural customs.

New approaches for agro-food chain studies

In recent years, important progress has been made in the development of new approaches for analysing the structure and dynamics of agro-food chains and networks (Lazzarini et al. 2001; Omta et al. 2001). Scientific approaches that contributed to the innovation of supply-chain and network analysis can be grouped into three main traditions:

- **Supply-chain management (SCM)** as a customer-oriented approach that aims at the integration of business planning for balancing supply and demand across the entire supply chain (Bowersox and Closs 1996; Cooper et al. 1997). Advanced information and communication technology systems are increasingly becoming the backbone of integrated supply chains (Lancioni et al. 2000; Porter 2001). Supply-chain management research is supported by mathematical modelling and simulation tools (Van der Vorst 2000; Trienekens and Hvolby 2001). Within SCM total quality management (TQM) and assurance systems such as good agricultural practices (GAP), good manufacturing practices (GMP), ISO and hazard analysis and critical control point (HACCP) gain importance (Luning et al. 2002). GAP, GMP and HACCP focus mainly at technology and ISO at management. TQM strives for continuous improvement in all functions in an organization based on a quality concept that is based on management commitment and employee empowerment and utilized from acquisition to service after sales (Kaynak 2003).
- **Network and contract choice (NCC)**, where the necessity for organizations to exchange resources is a key factor for inter-organizational relationships (Håkånsson and Snehota 1995). In network theory, forms of collaboration are not only based on economic motivations, but power and trust are equally important (Uzzi 1997). Social-capital theory has become an important new branch within the network approach. Network relations may enhance the ‘social capital’ of a company through improved access to information, technical know-how and financial support (Coleman 1990; Burt 1997; 2002). Empirical approaches for

analysing interfaces between agents within a network draw on contract choice theory (Hayami and Otsuka 1993). Making use of classic models for sharecropping, attention is focused on interlinked exchange transactions at input and commodity markets that respond to certain product or process standards and satisfy delivery conditions, while reducing monitoring costs and risk. Modern applications of contract choice also embrace chain quality management aspects (Weaver and Kim 2001) and loyalty issues (Saenz and Ruben 2004).

- The new institutional theory of transaction-cost economics (TCE) and agency theory provides the rationale for make-or-buy decisions (Rindfleisch and Heide 1997; Williamson 1987; 1999). These approaches are concerned with governance regimes for organizational cooperation, integrating views from business economics and organizational theory. Agency theory is directed at the ubiquitous agency relationship, in which one party – the principal – delegates work to another – the agent – who performs that work (Eisenhardt 1989).

Recent approaches devote major attention to the interfaces between technical and institutional strategies for overcoming the classical trade-off between (a) investments in improved product standards and process management practices; and (b) the derived value-added and income-generation effects at different stages of the commodity chain. Reduction of transaction costs and risks can be reached through improvement of the effectiveness in contract compliance between different agents involved in the chain (Sheldon 1996). Monitoring food safety increasingly depends on vertical coordination and contracting mechanisms that involve all relevant partners, with complementary roles for public and voluntary agencies (Antle 1996). These approaches make efforts for linking consumers' demands regarding food safety attributes and sensory preferences with producers' and processors' practices within the framework of global network governance and international chain integration.

CHAIN AND NETWORK COOPERATION

In an increasingly globalizing world, the organization of the agro-food sector is subject to rapid change. The institutional structure and governance regimes within global value chains are shaped by a series of structural changes that substantially modify the production and exchange relationships. We highlight the most important trends in supply-chain governance that are relevant for developing countries.

Buyer-driven chains

Chain cooperation has traditionally been based on producer firms that started to manufacture commodities in overseas factories. Foreign direct investments were focused on primary production and processing, while major concentration took place in upstream segments. In recent years, global buyers and retailers have begun to play a key role in the integration of production and distribution networks (Reardon and Timmer in press). Market access is highly dependent on participating in such global supply networks. Traditional commodity chains are also becoming more

differentiated (Fitter and Kaplinsky 2001). Rapid adjustment to changes in consumers' demands has become a key element of competitiveness.

Contractual governance

Spot-market relationships that were guided by prices are increasingly replaced by governance regimes characterized by hierarchy and managerial control (vertical integration). In addition, network governance through contractual relationships between autonomous firms is guided by complex sets of delivery arrangements, where price and non-price elements are equally important. Gereffi et al. (2002) distinguish between relational networks mediated by trust and reputation, modular networks using standards and information as coordinating mechanisms, and captive networks organized around monitoring and control. Innovative networks are characterized by multi-polar governance structures where potential drivers are located in different nodes of the chain. Reputation, trust and loyalty have become critical to guarantee effective governance.

Innovation through alliances

The locus and character of innovation processes are subject to important change. Instead of simple technology transfer, research and development activities now involve both technological and managerial dimensions. The processes of product development and upgrading are increasingly structured as co-innovation activities that take place in alliances between chain partners. This involves close linkages between 'hardware' (production, processing and logistics) with 'software' (organization, management) through expertise development based on the exchange of experiences with chain and network partners. International competition asks for a continuous learning through reorganization of production processes and network upgrading with strong interactions between design, production and marketing operations.

Continuity and flexibility

Supply-chain organization has become strongly oriented towards criteria of continuous delivery and flexible sourcing. Continuity is of vital importance to guarantee shelf space, while repeated transactions in the supply chain enable the establishment of reputation and trust. Logistical systems are optimized in order to reduce costly stock-keeping operations while avoiding out-of-stock. Forecasting of demand and flexibility in sourcing regimes – including options for global sourcing – enable retailers to guarantee year-round supply of perishable products at more or less stable prices.

Information and communication

Profits and trade margins increasingly depend on information flows regarding customer demands for design, packaging, distribution and servicing of products. Keesing and Lall (1992) point to critical information requirements that enable firms to improve competitiveness and market responsiveness. In addition to product information, retailers have to respond to consumers' concerns regarding food safety, labour standards and environmental effects. Control and compliance with these issues are ensured through entire chain monitoring, based on tracking and tracing information systems (see Box 3).

Box 3. Eurepgap

The branch organization of European retailers (Eurep) established a code for 'good agricultural practices' (GAP). Developing-countries producers have to fulfil a list of technical, handling and managerial practices to guarantee quality, consistency, hygiene and safety. Through regular inspections and the use of bar codes, a system of tight coordination is installed that enables entire supply-channel information and control. Local producers have to make substantial investments for complying with these rules, but only a limited number of producers acquire the preferred supplier status.

Grades and standards

The role of grades and standards (G&S) has shifted from a technical instrument to reduce transaction costs in homogeneous commodity markets towards a strategic instrument of competition in more differentiated product markets (Reardon et al. 1999) In addition, G&S have shifted from performance criteria related to product characteristics to process standards involving all chain operations, to assure consumers of the quality, safety and environmental and/or social characteristics of production and handling practices in distant locations. Finally, private labels, certificates and standards created and enforced by large international retail and agro-food companies are far-ahead public rules, enabling firms to create specific market segments and capture additional rents (Farina and Reardon 2000).

ROLE OF CHAINS AND NETWORKS FOR DEVELOPMENT

International partnerships for sustainable food production and poverty alleviation increasingly pay attention to the organization and performance of agro-food chains and networks. Improving market access and competitiveness of smallholders in developing countries requires concerted efforts for linking different stakeholders (producers, traders, processors and retailers) in order to reduce transaction costs and

to reinforce learning capacities. Meeting the market requirements of scale, reliable supply, loyalty and quality is critically important for reaching competitiveness.

Market forces urge supply-chain partners towards closer cooperation. Especially for local producers in developing countries who wish to participate in regional or global markets, supply-chain collaboration is of key importance for guaranteeing:

- access to new and profitable market outlets, based on supply-chain management for innovative product–market combinations;
- network governance for enabling timely responses to demands for capacity development and knowledge dissemination; and
- chain upgrading through partnerships that increase the size and distribution of value-added through improved production systems, information regimes or logistics.

The aspects of market access, governance and upgrading are commonly recognized as the three key dimensions to create opportunities for linking developing countries' producers to dynamic (local and international) markets.

Market access

Falling trade barriers do not automatically lead to better market access for developing-country firms, especially when supply chains are governed by a limited number of buyers. African smallholders are easily de-listed from vertically-structured horticulture supply networks oriented at European supermarket outlets (Dolan and Humphrey 2000), but can equally become marginalized in local delivery regimes (Boselie 2002).

European imports of fresh food and specialty vegetables (i.e. sugar snaps, baby corn, asparagus, etc.) have increased by 140% in value terms between 1989 and 1997, and sub-Saharan countries were able to capture a consistent 30% of the market share (Humphrey and Oetero 2000). What started as an off-season trade in temperate vegetables and specialist imports for the ethnic market has become a major all-season business.

Making supply chains work for development implies that local producers should not only be cost-competitive, but also able to comply with quality requirements, guarantee constant and reliable supply, and strictly maintain safety and health regulations. While family-operated smallholder farms usually exhibit advantages for producing labour-intensive products (Key and Runsten 1999; Dries and Swinnen 2004), the increasing capital demands for establishing processing facilities, cool chains and logistics systems tend to favour sourcing from larger firms, where inspection and monitoring benefit from economies of scale and scope. Supporting smallholder participation in supply chains not only requires initial market access, but particular attention should be given to consistency, e.g., the capacity to maintain constant deliveries and reliable and uniform appearance, taste and quality over time (Dolan and Humphrey 2000).

Different dimensions of market access deserve special attention. Since economies of scale in food processing and trade are usually larger than in primary

production, upstream ‘pooling’ of farmers through different forms of cooperative associations and networks has become of utmost importance.

Whereas competitiveness may be initially derived from resource and location advantages, access to market information is becoming a main dimension for maintaining competitive advantage. Entry into international markets also requires that due attention is given to delivery and packaging standards that constitute key elements for maintaining any comparative advantage.

For acquiring market access various strategies can be pursued that rely on distinct marketing channels. Van der Laan (1993) distinguishes between (a) entire-channel crops (mainly perishables), where direct contacts and strict coordination between producers and importers are critical for quality assurance; and (b) half-channel crops (standardized products) that split the chain into different segments between producers and exporters. The latter option may initially provide somewhat better opportunities for local smallholders. In addition, most producers rely on multiple market outlets for different quality categories of their production. Once a strong position is gained at the local market, production could be gradually scaled-up towards more demanding (and rewarding) regional or international outlets. Reardon and Timmer (in press) consistently argue that there is still considerable scope for enhancing the competitive position of smallholders in domestic and regional supply chains. Important margins for improving value-added can also be found in strategies for optimizing logistics and information systems (see Box 4).

Box 4. The Dabbawallas network in Mumbai

Over 200,000 people working across a 70-km stretch around Mumbai city (India) receive every day their lunchbox (*dabba*) through a carry and delivery system operated by Mumbai Carriers Association, a relatively flat organization run and managed by a group of largely illiterate rural working-class people using nothing more than three or four symbols crudely painted on the boxes to guarantee timely delivery. The boxes are home-made and carried by ‘*wallas*’ to hub metro stations where they are reassembled for further transmission via local trains. At the destination, the process of further distribution is spawned. The *dabbawalla* system is based on face-to-face communication where each box changes hands at least four times, but intuition and teamwork guarantee that it operates at very low costs (Rps 100/month) and a surprisingly low error rate (less than 0.5%) for a system of its size.

Source: Kumar et al. (2001)

Network Governance

Given the tendencies of urbanization and globalization, supply chains for agricultural and food products are increasingly challenged by consumers’ demands

regarding quality and safety. Delivery conditions and procurement regimes also require constant and reliable supply and tend to favour the development of selective preferred-supplier relations. Local smallholders can better compete if embedded in institutional partnerships which enable network coordination and strengthen entrepreneurship in order to pursue a gradual improvement of the terms of trade.

New communication regimes enable business processes to be compressed in time but extended across space. Competition is not only based on production technologies, but far more on new forms of supply-chain organization. The effectiveness of governance networks is strongly related to the establishment of long-term, stable and durable relations between supply-chain partners and a common understanding of shared values. Producers operating at more customized market segments (i.e. certified fair-trade and organic products) also need to organize credible supervision by a third party to ensure that specific production practices are maintained.

Innovation and adaptation are key capacities that need to be developed within suppliers networks. Different types of supply chain operate under governance regimes that provide specific types of incentives for innovation. Within vertically structured delivery chains, the lead firm is fully engaged in the entire range of production activities and exercises strict control over upstream operations (Sturgeon 2001). When firms start relying on subcontracting and outsourcing, most design and product development activities are still maintained by the buyers, and producers frequently need to adapt to changing market demands. Under preferred-supplier regimes, tracking and tracing systems are put in place to guarantee full process control. With increasing technological capabilities in the producing countries – particularly in SE Asia – some local companies acquire greater independence and may eventually become competitors in the market.

Networks strongly rely on agency coordination and tend to be structured in such a way that behavioural and investment risks are controlled. Contracts are increasingly used as instruments to improve product quality and to enforce permanent supply (as well as to define liability in case of substandard deliveries), but trust building is required to guarantee real loyalty and to reduce opportunistic behaviour. Resource-providing delivery contracts proved to be particularly effective in settings where land rents are high and production operations rather labour-intensive, linking smallholding operations with remote markets (Key and Runsten 1999). Co-investment schedules, where private firms – together with banks, state agencies and knowledge institutions – are jointly engaged in supply-chain development, can provide useful leverage for spreading risk and improving the spread of innovations. Finally, companies also started to appreciate transparency and accountability within supply chains as an intrinsic element of their strategies towards corporate social responsibility (CSR and triple P).

Chain upgrading

Agro-food chains nowadays involve considerable processing activities that generate most value-added. Specialized knowledge regarding appropriate inputs, handling

practices and logistics is considered of key importance for quality upgrading. Other strategies related to product development and eventually labelling and certification may offer prospects for improving the size and distribution of value-added. In addition, improved access to specific market segments can improve the bargaining opportunities for local stakeholders.

Gereffi et al. (2002) distinguish between four different strategies of upgrading for improving the competitive position of firms: (a) product upgrading; (b) process upgrading; (c) intra-chain upgrading; and (d) inter-chain upgrading. While the first two strategies focus on the development of new products or production systems, the latter two strategies aim acquiring particular competences that enable to start new activities in other market segments or sub-sectors. Successful upgrading proves to be highly dependent on innovative capacities and local institutional support.

Supply-chain management is increasingly considered an important tool for value-added creation. Upgrading strategies can either focus on *diversification* into specific product attributes customized towards particular consumer outlets where premium rates are paid (see Box 5), or be based on market *segmentation* by the labelling of particular products through location-specific branding, packaging or marketing standards. Coffee is a well-known case, where both speciality coffees (gourmet, organic, fair-trade) and branding (Café de Colombia) account for increasing market shares (Fitter and Kaplinsky 2001; Humphrey and Oetero 2000). Upgrading in the fruit and vegetables sector is strongly based on product diversification, but more recently added value is increased through local processing activities (e.g. Ahold fruit salads prepared in Ghana; pre-packed ready-to-eat beans from Kenya for UK supermarkets). A further strategy for increasing value-added emerges when developing-countries producers become shareholders of marketing companies in the North (like in the European fruit company Agrofair), while some UK importers have taken equity stakes in East-African export companies.

Box 5. *An indicator system for sustainability in coffee chains*

In the coffee sector, important progress has been made for establishing an integrated sector-wide indicator system to assess advances in economic, social and ecological sustainability (focusing on the classic People-Planet-Profit dimensions) and to communicate these achievements to consumers. The broad sustainability concept is translated into audible and measurable indicators, and specific tools and guidelines are developed to enhance the performance of stakeholders in the coffee chain. Assistance is provided to enhance capacities amongst the industry, producers' associations and state agencies for joint implementation of a common code for sustainability in coffee.

Source: Vellema and Boselie (2003)

CRITICAL ISSUES FOR CHAIN AND NETWORK COOPERATION

The effective participation and equitable integration of producers from developing countries in regional and international agro-food supply chains and networks is subject to a wide number of individual competences and institutional constraints. Inclusion or exclusion from production and delivery networks is decisive for way the gains from globalization are spread. We therefore discuss three critical factors that enable developing-countries producers' engagement in integrated agro-food supply chains.

Building experience and trust

Governance in supply chains is exercised through a complex mixture of performance standards combined with behavioural incentives for enforcing compliance. With rising monitoring and auditing costs, building trust and loyalty becomes increasingly important. Since effective coordination within international supply chains turns out to be a cornerstone for maintaining competitiveness, relationships between producers and importers are likely to evolve towards closer interdependence. This is particularly the case when large fixed investments for processing and logistics create asset specificity that can only be contested with long-term delivery contracts (Hueth et al. 1999; Ruben et al. 2004).

Dovetailing learning and innovation

The competitive advantage for agro-food supply chains originating in developing countries is increasingly based on management coordination and adaptive capabilities for responding to changing market demands. Similarly, entrepreneurship is developed through a dynamic process of learning and innovation. Management of innovations within chains and networks requires an interactive process at the interface of customers and suppliers, sometimes also involving knowledge institutions and even competitors (Omta 2004; Håkånsson 1982). Challenging examples of such international co-innovation processes are found in the optimization of logistics and warehouse operations for fruits and vegetables in South Africa and Central America (see case studies included in this volume), and the upgrading of dairy delivery systems in Latin America (Dirven 1999; Farina 2002).

Sharing benefits and rents

The creation of added value is increasingly taking place in the intangible parts of the supply chain, where design skills and brand names are controlled (Kaplinsky 2000). The advantages from integrated supply chains are mainly derived from 'systemic' efficiency where the profits of coordinated action are higher than the returns that can be reached by individual agents. New product-market combinations or improved management procedures generate dynamic rents that are likely to accrue to the most

innovative parts of the chain. Distribution of value-added is therefore contingent on the possibilities for engagement in chain upgrading. The development of the *Senseo* coffee-pad technology is a typical example of such technological cooperation between electronics and food industries, shifting the locus of value-added creation to downstream segments of the agro-food system.

STRATEGIES AND POLICIES

Supply-chain management and network governance essentially belong to the private-sector domain. There are, however, several valid reasons for engagement of the public sector and voluntary organizations in improving the chain environment. We outline five main directions of strategic support and potential leverage towards sustainable and equitable chain and network integration, focusing on the complementary roles of public and private agencies.

Reinforcing the business climate

Macroeconomic stability of the exchange rate, control on inflationary pressure and a liberal trade regime are critical investment conditions. In addition, legal protection of (foreign) direct investments and political stability (including corruption control and accountability of tax and trade agencies) represent key elements for establishing integrated agro-food supply chains in developing countries. Public investments for infrastructure provision and social services (education, health care) are equally important to provide an enabling environment for business development.

Given the resource-based character of most agro-food industries, national market integration is key to further growth. Reardon and Timmer (in press) argue that at least 85 percent of food is consumed domestically, and this is particularly true for fresh and perishable products. In recent years, important progress has been made towards spatially and temporally integrated staple markets in most developing countries (Barrett 2001; Badiane and Shively 1998). Price variability of non-staple food products and processed foods is, however, still very large and subject to frequent shocks.

Developing countries are also becoming increasingly involved in international trade of processed foods. Between 1980 and 2002, the value of agro-food exports roughly doubled from \$200 to \$400 billion (FAOSTAT 2004), but the share of bulk grains dropped from 45 to 30% and major growth was realized in perishables (fruit, vegetables, flowers, fish and meat) and particularly in processed foods (juice, beverages, snacks, etc.) that increased from 18 to 34% (Regmi and Gehlhar 2003 cited by Reardon and Timmer in press). Although foreign direct investments were important to mark this shift, some of these activities were originally oriented towards domestic consumers and gradually 'upgraded' towards regional or international market outlets. Moreover, while in some cases domestic supply was seriously affected (most notably increasing protein deficits due to fisheries exports from Lake Victoria; see Henson et al. 2000), for most other industries domestic outlets still represent an important subsidiary marketing channel.

Establishing the legal framework

Agro-food companies operate within an environment where production practices directly influence consumers' welfare. This implies that there is a legitimate role for public (sometimes semi-autonomous) agencies to exercise control on the maintenance of food safety rules and regulations. In addition to international standards (FAO *Codex Alimentarius*, SPS agreement), also national grades and standards are in place that sometimes compete with private rules for Good Agricultural Practices (GAP). Public regulation may involve normative codes regarding health and safety, but also includes compliance with labour and environmental standards. The latter are strongly advocated by (inter)nationally operating non-governmental organizations, like Greenpeace, IUCN, Oxfam and others. Particular initiatives for labelling fair and ethic trade intend to make food trade more transparent and try to mobilize consumers for these issues. In a similar vein, the private agro-food industry sector has organized a Sustainable Agriculture Initiative (SAI) as an effort towards shaping its corporate social responsibility.

Another aspect of the legal framework refers to ownership rights and the supply-chain governance structure. Apart from the required securities for realizing fixed investments, an important part of supply-chain control nowadays rests in so-called intangible competencies (RandD, design, branding, etc.), which are characterized by high entry barriers and command highest returns (Kaplinsky 2000). As long as the operations of developing-countries firms remain limited to production activities, they are likely to exercise limited governance power and will receive a minor share of the value-added. Joint ventures and strategic alliances between local and international firms may enable producers to acquire business practice and learn best practices. Other options for reinforcing collective action assign a role to business associations in providing market information and monitoring food standards. Finally, sector-wide organization of producers (such as the Fresh Produce Exporters Association of Kenya; FPEAK) may offer prospects for creating countervailing power.

Safeguarding consumers' interest

Governments play an important role in guaranteeing the availability and safety of agro-food products to local consumers. It is therefore in the interest of local consumers that regular inspections take place, and that an acceptable degree of local competition is maintained to guarantee that retail prices are established under competitive conditions. Given the increasing size of domestic markets, the rapid rise of supermarkets in developing countries takes place under intense competition and (poor and middle-class) consumers appear as the main winners (Reardon and Timmer in press), but in the future further concentration in retail and agribusiness may lead to the progressive elimination of small shops and shrinking of wet markets. There is thus certainly room for competition policies that facilitate market entry for (local) producers.

Reducing transaction costs

Guaranteeing the participation of smallholders in agro-food supply chains requires reduction of transaction costs. Market entry is very much dependent on both internal and external economies of scale and scope. Therefore, public provision of road infrastructure and public support for education and training remain critical for overcoming start-up problems. Transport costs and qualification of the labour force are thus becoming key dimensions of the comparative advantage.

Internal economies of scale can be reinforced through decisive efforts towards the establishment of farmers' associations or cooperatives. Notwithstanding the general negative experiences with cooperative production (see Ruben and Lerman 2005; Berdegué Sacristán 2001), farmers demonstrate wide interest in joining efforts for improving market access. Higher food-quality and safety standards can also be better met if farmers make joint investments and are willing to exercise mutual control on free-riding. The latter may provide important cost advantages to small producers who are able to reduce monitoring costs. In addition, cooperatives could exercise bargaining power vis-à-vis traders and retailers and thus gradually improve their share in value-added.

Managing risk

Further engagement of smallholders in (inter)national agro-food supply chains is seriously constrained by risk motives. Fafchamps (2004) provides an extensive overview of the discouraging effects of price uncertainties, risks of product denial and contract breach, and the implications of delayed payments in sub-Saharan markets. Similar evidence on market and price risks in Latin America is presented by Barham et al. (1992).

There is a decisive role to play for public agencies in guaranteeing the legal framework and defining transparent rules for conflict settlement. Farmers can only make the required investments to improve delivery frequency and quality when they can be relatively certain regarding available market outlets. Key and Runstein (1999) indicate that contract farming provides best outcomes under conditions where public surveillance is guaranteed. In addition, some West-African governments have organized market intelligence services to guarantee open access (through radio emissions) to price information. More promising experiences are reached with private-based pre-paid mobile-phone lease facilities in Bangladesh that enable farmers to contact relatives in other places in order to obtain price information (Courtright 2004).

Provision of credit and insurance represents a second major strategy for risk management. Experiments are underway that provide weather insurance to farmers in rain-fed regions upon payment of a fixed hectare fee, thus preventing distress land sales in cases of unexpected harvest losses (Bie Lilleør et al. 2005). More important for supply-chain integration are insurance provisions that are part of the delivery contract (Bogetoft and Olesen 2004). In order to avoid disputes between producers and traders, rules for quality inspection and timely payments need to be sufficiently clear and enforceable. Preferred supplier arrangements may include provisions for

cost-sharing and repeated transactions that provide farmers with the required security for making fixed investments.

OUTLOOK

The different contributions included in this volume provide a comprehensive overview of the current state of the art in the field of agro-food chains and networks and their potential contributions to the development process. The book is divided into three parts: (1) a number of analytical papers that address the roles of public, private and voluntary agents in shaping partnerships and alliances that may support market access and permanent supply-chain linkages for smallholders; (2) a series of seven business cases that provide illustrations of particular strategies for supply-chain integration and that identify the critical factors responsible for successful alliances; and (3) three concluding articles that discuss policy implications and provide some strategic guidelines for further action towards the promotion of sustainable and durable network cooperation throughout (inter)national agro-food supply chains.

The articles included in this volume bring together different viewpoints from the public agencies (Roberto Rodriguez, the Brazilian Minister of Agriculture), the business sector (Alfons Schmid from Royal Ahold; Jeroen Bordewijk from Unilever and Johan van Deventer from Freshmark South Africa) and local farmers organizations (Leonard Kariuki from the Kenyan National Federation of Agricultural Producers and Gonzalo la Cruz from the Peruvian Fair Trade Banana Organization). In addition, attention is given to the interfaces between public and private grades and standards (Tom Reardon from Michigan State University) and the role of local agro-food chains and street markets (Olusola Oyewole and Biola Phillip from Nigeria).

The seven selected business cases highlight different dimensions of the organizational structure and management regimes of integrated supply chains originating in developing countries. Cases are presented concerning improved sourcing regimes for supermarket supply of fresh fruits and vegetables in Thailand (Jan Buurma and Joempol Saranark), the design of supply-chain information systems and logistics for fruit exports from South Africa to The Netherlands (Anneke Polderdijk and colleagues), the upgrading of beef supply chains in Brazil (Marcos Neves and Roberto Scare), the quality and management constraints in the Nile-perch supply chain from Lake Victoria (Ronald Schuurhuizen, Aad van Tilburg and Emma Kambewa), the prospects for certification in the organic cocoa chain from Costa Rica (Maja Slingerland and Enrique Diaz Gonzales), the integration of novel supply chains for *Allanblackia* oil in Ghana (Lawrence Attipoe, Annette van Andel and Samuel Kofi Nyame) and the development of supply chains for medical plants in India (Petra van de Kop, Ghayur Alam and Bart de Steenhuijsen Piters).

Finally, the volume provides three concluding chapters that address the challenges for researchers and policymakers. Louise Fresco of the United Nations Food and Agricultural Organization (FAO) outlines what can be done to enhance sustainable agro-food chains through more comprehensive and inclusive standards.

Kees van der Meer of the World Bank provides a detailed overview of the factors that lead to inclusion or exclusion of smallholders from coordinated agro-food supply chains. The editors conclude with a summary of the critical economic, institutional and policy issues that need to be considered in order to guarantee support for smallholder market access, capacity development and functional upgrading that can contribute to dynamic and responsive agro-food chains.

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