

Agri-Supply Chain Management

**To Stimulate Cross-Border
Trade in Developing
Countries and Emerging
Economies**

Jan van Roekel, Director, Agri Chain Competence center

Sabine Willems, Agri Chain Competence center

Dave M. Boselie, Wageningen UR – Agricultural Economics Research Institute (LEI)

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Summary

Market liberalization and increasing consumer demand in OECD countries offer attractive opportunities for agricultural exporters from developing countries. Trade in fishery products, exotics, pre-cut products, organic products and off-season fresh fruits and vegetables extend altogether new options for businesses. Yet, global market standards are stringent. Consumers in these countries and in urban areas in developing and transition economies demand safe and nutritional food, excellent quality and just-in-time delivery. This presents major challenges to producers and countries that lack state-of-the-art technologies and infrastructure. Particularly for producers in these countries, collaboration between trade partners has become increasingly important for the success of cross-border trade in the competitive market.

Supply chain management is a powerful tool to achieve this collaboration. Through supply chains, producers in developing countries and emerging economies can access market information and knowledge to hone their value-added activities. Developing cross-border supply chains is complex, however, and requires information and expertise about how to build chains, as well as communication and commitment from all the chain partners. The advantages of supply chain management are numerous, like the reduction of product losses, increase in sales, reduction of transaction costs, a better control of product quality and safety and the dissemination of technology, capital and knowledge among the chain partners. Supply chain management tools have been developed and implemented throughout the chain to guarantee optimal chain performance.

Supply chain development not only benefits the private sector but also creates spin-offs that stimulate social, economical and environmental sustainable development in the region (employment generation, added value, decreases of product losses, etc.). Public support (e.g. development of the institutional infrastructure) plays an important role to create an enabling environment for private sector development. Public support might take the form of a public private partnership in a supply chain to share experiences, risks and bottlenecks. In developing countries and emerging economies, however, supply chain development is often hampered due to lack of governmental support. International organizations can assist these governments to upgrade cross-border trade and to link national and international partners to jointly tackle cross-border trade obstacles. Institution building, raising awareness, pilot chain projects and the development of a toolkit are important activities to foster supply chain development.

This paper reviews issues of the development of supply chains with special emphasis on challenges for developing countries. Three cases of cross-border supply chain pilot projects are described in this paper. These cases show factors for success and risks for supply chain development. Trust, commitment and transparency among the chain partners are important success factors for supply chain collaboration. Social and cultural differences between the chain partners, as well as hidden agendas, can lead to slow down of chain performances. The cases also indicate that certain aspects of chain development (e.g. food safety and social accountability) touch upon the responsibility and mandates of both public and private agents. Public-private partnerships are therefore indispensable in these areas.

Perspectives for Chain Partners in Developing Countries

Globalization offers opportunities to developing country producers and exporters. One such opportunity is the year-round provision of fresh agricultural produce. Transnational companies, as well as retailers and importers are expanding their international operations to meet new consumer demands. This means that demand is no longer confined to local, at best regional, supply. Fresh produce can now be shipped from halfway across the world at lower costs and competitive prices. Moreover, advanced information technologies enable traders to respond quickly to changes in consumer demand and facilitate the flow of goods in today's highly complex global marketplace.

Consumers' mounting concerns regarding food quality and safety, government-implemented trade regulations and tough retail standards have increased the requirements for producers throughout the world. In developing countries and emerging economies, however, companies face particular challenges in adapting to these changing requirements.

Producers in developing countries are capitalizing on opportunities by entering into partnerships with other businesses active in the global food chain. This is seen, for example, in East African producers' involvement in the fresh cut-flower business and in the fresh fruit sector in South America (Jaffee, 1994). In various cases, local farmers have linked their production activities to the interests of transnational companies, thus achieving vertically controlled operations in a cross-border supply chain.

Cross-border supply chains are incontrovertibly a vehicle by which new forms of production, (on-farm) technologies, labor processes and organizational relations and networks are introduced. The trade relations between Mexico and the United States are an example of how supply chains induced shifts in production methods, social divisions of labor, on-farm technologies, and can cumulatively reorganize an entire fresh produce supply system. It is through these shifts that Mexican producers have become the suppliers of North America's 'salad bowls' (Little and Watts, 1994). With the increasing scale and international consolidation of markets for agro-industrial products, investments and activities in local markets are set to increase throughout the world.

Supply chains not only benefit the companies directly involved, they also stimulate social, economical and environmental sustainable development within a region or country. Cross-border supply chain development can, for example, stimulate the development of local agro-industry, employment generation, local food production, value addition to products, introduction of new technologies, decreasing product losses, increased export earnings, and improved food safety and nutrition by connecting chain partners and their activities.

Box 1: Cross-Border Supply Chain Development Defined

Cross-border supply -chain development seeks innovation in the agricultural sector, on the one hand to foster a market-oriented integrated agro-system and on the other hand to provide an arena for economically, socially and environmentally sustainable development.

However, there are concerns that poor small-scale producers are in a disadvantageous position to adjust to new market conditions. These producers are often the least organized group in the supply chain. Most have small-scale operations, use traditional techniques, depend on family labor, and have little capital to invest. Producers with access to capital, technology and logistics may be best positioned to reap the benefits. As a result of increased competition, poor small-scale producers may turn out as the losers.

To grasp new opportunities for trade and income, chain partners in developing countries - producers, processors and exporters - must adapt to the quality and safety requirements and standards of importers and retailers. To adapt, however, they first need to understand markets, strategically plan their activities, have access to means to improve products and to upgrade production systems. Above all, to profit from the emerging opportunities, chain partners in developing countries and emerging economies must shift from an internal product orientation to an external market orientation (table 1). This is, however, a big challenge.

Table 1: Product-oriented versus market-oriented enterprises

<i>Product-Oriented Enterprises</i>	<i>Market-Oriented Enterprises</i>
<ul style="list-style-type: none"> • Focus is on product • Strive is towards production maximization • Planning is operational • Information exchange is limited 	<ul style="list-style-type: none"> • Focus is on product-market combinations • Strive is to maximize added value • Planning is strategic • Information is shared along the supply chain

Whereas on the one hand there are opportunities for developing countries to benefit from increased international trade opportunities, there are also concerns that producers in these countries can not upgrade their production system to compete on the global market and that these countries do not have the required institutional and infrastructural facilities to reap the benefits. For meeting increasing standards, the private sector in these countries should invest and engage in new market arrangements. However, the private sector competitiveness may be limited because of inadequate support and capacities from the public sector and a lack of basic social and physical infrastructure (Farina & Reardon, 2000). Public sector support (e.g. development of the institutional infrastructure) to enhance capacity of the private sector to develop consumer oriented products and to enter new markets is therefore a requirement for successful cross border trade.

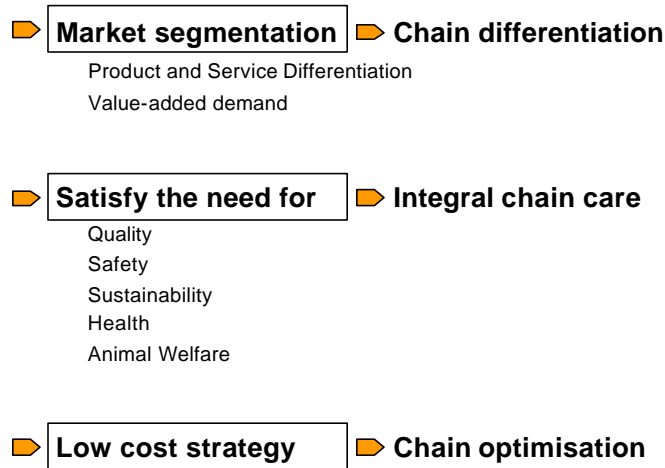
This paper reviews issues of development of cross-border agri-supply chains with special emphasis on challenges for developing countries. The next section introduces agri supply chain management and cross-border agri-supply chains. It reviews how cross-border agri-supply chains develop and flourish in today's consumer-oriented markets. Section three indicates the importance of the involvement of the public sector and the role of the government in agri-supply chain development. The fourth section moves on to explore three examples of agri-supply chain development - in Ghana, South Africa and Thailand. A final section concludes factors of risk and success for cross-border agri-supply chain development.

Agri Supply Chain Management

Three main important market driving forces urge supply chain partners to collaborate, namely market segmentation, consumers' demand and low cost strategy (figure 1). Especially for chain partners in developing countries who wish to participate on the global market (far away markets),

supply chain collaboration is of utmost importance for the connection with profitable markets and consumer's demands, the flow of information, goods, technology and capital and to limit transaction costs.

Figure 1: Current market driving forces



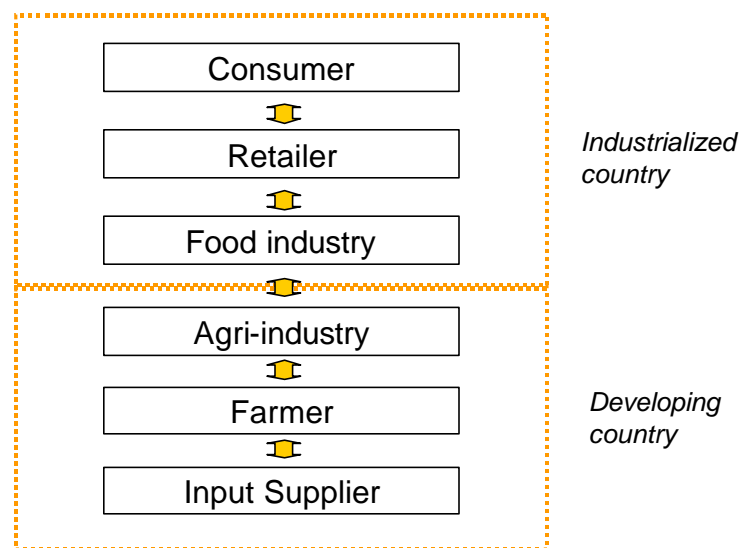
The changing life-style of especially western consumers' is driving demand for particular products such as organic, exotic, fair trade, pre-cut, ready-to-eat products, etc. This development challenges chain partners to differentiate their chain to offer value-added products and services to a particular market segment.

Consumer choices are increasingly being determined by requirements in the area of safety and health. Care for the environment, social components and animal welfare are becoming more important. Striving to sustainability is the new goal set by society. All companies in the chain should cooperate together in order to avoid loss of consumer confidence. Integral chain care and quality assurances are the key.

The supply chain partners are being forced to minimize costs because of the increasing worldwide competition. The collaboration of the successive links to tune activities and minimize costs by decreasing transaction costs optimizes chain results.

Supply Chains

We speak of a 'supply chain' when different actors are linked from 'farm to fork' to achieve a more effective and consumer-oriented flow of products. This paper focuses on agri-supply chains that incorporate actors from developing and developed countries (figure 2). Such supply chains may include growers, pickers, packers, processors, storage and transport facilitators, marketers, exporters, importers, distributors, wholesalers, and retailers. Supply chain development can thus benefit a broad spectrum of society, rural and urban, in developing countries.

Figure 2: Cross-border supply chain

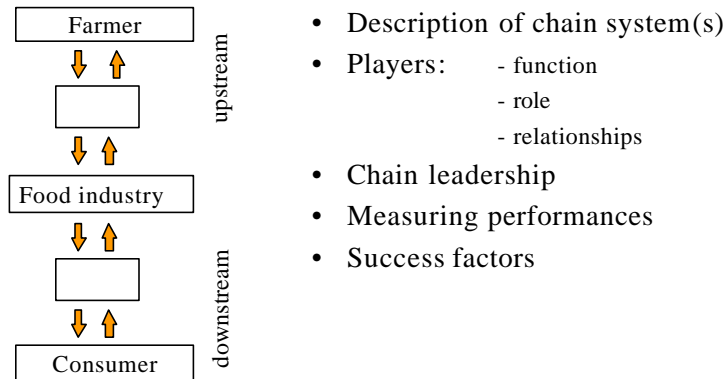
Building Supply Chains

Supply chains are not developed by itself but requires a lot of efforts and competencies of those involved. Before a supply chain is developed, certain steps have to be taken in order to formulate the right chain organization. Special care is required for the formation of cross-border supply chains as differences in business and social culture can have for instance large influences in the performance of the chain collaboration.

The first step in agri supply chain development is the analyses of the existing trade system and the trade environment (product flow, exchange levels, forces affecting the operation of the supply chain such as governmental policies, etc.). From this analysis, potential supply chain players can be identified and their function, role and relationships in the trade system can be delineated.

The success of a supply chain depends on a strong chain leader. The chain leader acts as the supply chain manager. The explicit acceptance of the chain leader is very important for initial chain formation and the sustainable supply chain collaboration.

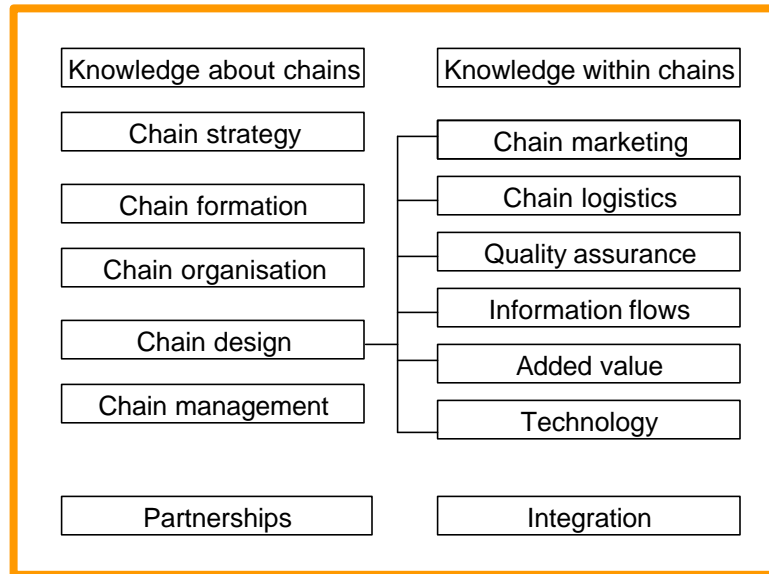
Included in the analysis, the performance of the supply chain should be measured according to criteria set by the chain partners (such as efficiency, flexibility, innovation, responsiveness, etc.). For international benchmarking, the present situation in the chain organization will be compared to the desired situation. Through this benchmarking, the different aspects of the supply chains can be analyzed and the critical success factors can be determined. A SWOT-analysis is conducted for the overall assessment to assess the strengths and weaknesses of the supply chain and the opportunities and threats of the supply chain environment.

Figure 3: Supply Chain Analyses

Chain Competence

The development of supply chains requires knowledge and expertise *about chains* and *within chains* (figure 4). Knowledge about chains concerns the functioning of chains as a whole. The supply chain strategy is of utmost important for the competitive position of all chain partners. To determine the chain strategy, it is crucial to understand the consumer and the competitive environment. Chain partners still focus mainly on internal strategies such as back-to-core and cost-cutting strategies aiming to respond to severe competition and low margins. Anticipating on consumer's demand is becoming more and more important (Rabobank International, 2002). At the developing stage of a supply chain, representatives of the chain partners formulate the strategy of their chain.

Knowledge on chain formation prevents these chain partners from pitfalls in the process of chain formation. Chain organization knowledge assists to find the appropriate partners that complement each other. Knowledge *about chains* is essential to developing a workable architecture but knowledge *within chains* is essential for assuring sustainability. Knowledge within chains concerns the execution of specific functions within a chain, like chain marketing, logistics, information flow, etc. It is going to be crucial to all chain partners to be actively involved and to respond as fast as possible to market changes. Key factors of success for supply chain development are partnerships and integration.

Figure 4: Knowledge about chains and within chains

Cross-Border Chains

Cross-border chains, and especially chains that include partners from developing and developed countries, are rather complex since many differences in social and commercial aspects exist between these partners that influences the success of a supply chain. Trust and commitment are crucial elements to achieve partnerships and chain integration. Because of the different trade environments in which cross-border supply chains operate, chain partners have to deal with several trade regulations and laws (national and international), a large logistic network, different levels of technologies, etc. Awareness of each other situation (for instance access to IT tools, transport facilities, etc.) is a very important.

Three cases of cross-border supply chain development are presented in section 4 of this paper. These cases show how these particular supply chains were developed in a pilot project context, which obstacles had to be taken and what the common goal of the chain project was. Although the products in the supply chain of the third case (Fresh food supply chains in Thailand) does not cross borders physically, this case can surely be seen as a cross-border supply chain because many of the project participants are international companies, organizations and research institutes¹. The reason to include these international parties in the project was to upgrade the supply chain to an international level (food quality and safety measurements) in order to increase the competitiveness of the chain on the local market and to create international opportunities for the national chain partners involved. The social and commercial differences between the different

¹ Royal Ahold, Soci t  G n rale de Surveillance (SGS), Syngenta, Rabobank International, Agriculture Economics Research Institute (LEI), Wageningen School of Management.

international project participants were obvious in this project and had to be dealt with to assure a trust relation between the parties. This has proven not to be easy but turned out to be possible because the supply chain partners were willing to. We therefore define cross-border supply chains as chains that include international partner relationships and thus operate in an international context.

Supply Chain Management and its Benefits

Managing supply chains requires an integral approach in which chain partners jointly plan and control the flow of goods, information, technology and capital from ‘farm to fork’, meaning from the suppliers of raw materials to the final consumers and *vice versa*.

In order to react effectively and quick to consumer’s demand, supply chain management is consumer-oriented. It aims at coordination of production processes (Lambert and Cooper 2000, Handfield and Nichols 1999). Supply chain management results in lower transaction costs and increased margins. Because of the many activities and aspects involved it demands a multidisciplinary approach and sustainable trade relations. Supply chain partnerships are based on interdependence, trust, open communication and mutual benefits.

The advantages of the supply chain management approach are numerous. Some important advantages are:

- Reduction of product losses in transportation and storage.
- Increasing of sales.
- Dissemination of technology, advanced techniques, capital and knowledge among the chain partners.
- Better information about the flow of products, markets and technologies.
- Transparency of the supply chain.
- Tracking & tracing to the source.
- Better control of product safety and quality.
- Large investments and risks are shared among partners in the chain.

Supply Chain Management Tools

A range of new supply chain management tools have been developed over the past decade. ‘Efficient consumer response’ (ECR) has been developed to increase the consumer orientation and cost-effectiveness of supply chains (Kurt Salmon Associates, 1993). New management systems have been implemented to improve logistics, increase the use of information and communications technologies and boost quality management (Lambert and Cooper, 2000). New-generation cooperatives are emerging, strengthening the position of farmers’ groups (Cook et al., 2001) and strategic partnering and vertical alliances are cementing sustainable partnerships throughout the supply chain (Zylbersztajn & Farina, 1999).

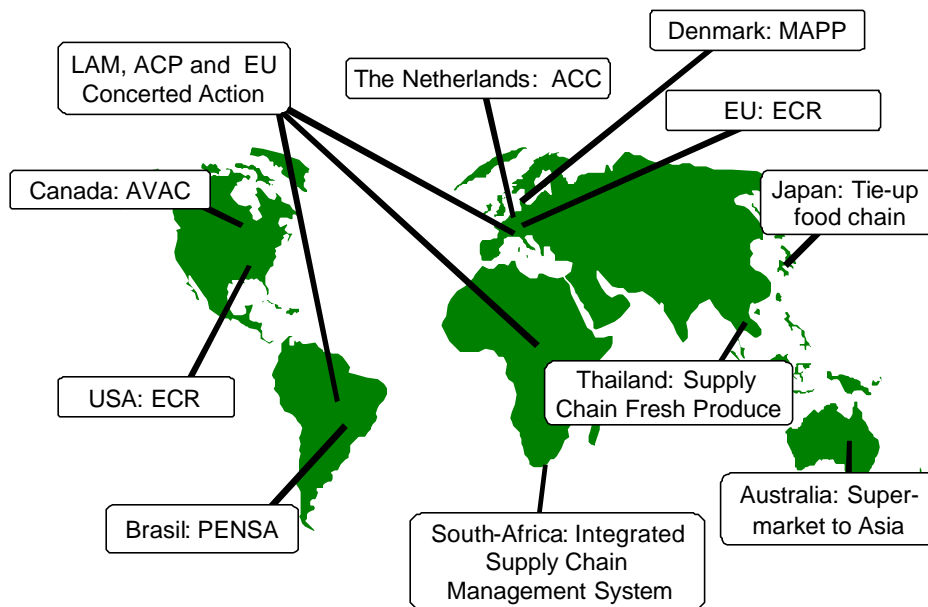
Food safety concerns have led to the development of ‘integral chain-care’ tools such as social accountability, good agricultural practice (GAP), total quality management, and HACCP (hazard analysis at critical control points). Implementation of such tools throughout a cross-border supply chain enables chain partners to ensure the quality and safety of their products and guarantees acceptable social chain performance. Supermarkets in Brazil and Thailand, for example, have

initiated total quality management programs and HACCP rules for perishables like fresh fish and meat.

Retailers (e.g., Walmart, Carrefour, Royal Ahold, Tesco and Sainsbury) have increasingly established their own quality standards (e.g., EUREP-GAP and BRC²) which suppliers must meet. Tracking and tracing systems are used to certify the quality of products and ensure transparency in the flow of goods throughout the supply chain. Implementing such standards and systems impacts not only the organization of supply chains, but also financial aspects of chain cooperation (Cook et al., 2001). These standards and systems are now being used in the agricultural sector and have proven their value in cross-border projects, as we will see in the examples described in section 4 below.

Sharpened requirements for standards have prompted public and private actors to establish a variety of initiatives to build or strengthen agri-supply chains. Figure 5 locates a number of these. Box 2 (page 13) describes one of these initiatives, the Netherlands-based Agri Chain Competence Center (ACC).

Figure 5: Initiatives to build or strengthen agri-supply chains



ACC: Agri Chain Competence Center
 LAM: Latin American, Mediterranean; ACP: African, Caribbean, Pacific; EU: European Union
 MAPP: Center for Market Surveillance, Research and Strategy for the Food Sector
 AVAC: Center for Development of Agri Chains Added Value
 PENSA: Agri Chain Development Program

² See Web sites at www.eurep.org and www.food-safety-systems.co.uk/brc.htm

Role of Government in Agri-Chain Development

As shown in the previous section, supply chain development does not occur by itself. It requires effort and commitment from all chain partners. Supply chain development not only benefits the private sector but also creates spin-offs that stimulate social, environmental and economical sustainable development within the region (employment generation, added value, decreases of product losses, etc.). Public support plays an important role in the development of supply chains to create an enabling environment for private sector development.

However, in developing countries and emerging economies, supply-chain development is often hampered due to lack of government support for communication and transport infrastructure (e.g., roads and ports), agricultural research and extension services, and financial institutions. Indeed, developing country governments rarely actively encourage cross-border supply chain development with policy incentives. Agricultural trade may instead be frustrated by price controls, disruptive fiscal and monetary policies and inward-oriented development strategies. The integration of agricultural trade into the World Trade Organization (WTO) commitments is also far from complete. In the meantime, sanitary and phytosanitary (SPS) measures, depressed global prices due to export subsidies and tariffs, and quotas and strict safety and quality regulations imposed by importing countries continue to exclude poor countries that do not or cannot adapt.

In fact, governments can improve the environment for agri-chain development by:

- Organizing platforms for public and private actors to exchange information on bottlenecks in cross-border agricultural trade. The ultimate goal here is to formulate and implement policies (e.g., product and production standards, codes of conduct) to stimulate cross-border agri-chain development.
- Investing in transportation, communication and electricity.
- Offering incentives for sustainable use of production resources.
- Offering subsidies or co-financing supply for high-risk investments.
- Establishing and enforcing a commercial code that includes property rights and fair and expeditious judicial processes for resolving contract disputes.
- Ensure the availability of (production, price, industry) information and statistics to facilitate market activity and to monitor market progress.
- Assembling a body of knowledge on supply chains through supported research institutions or programs. This knowledge inventory could then be used to develop a set of tools and lessons learned for firms at the start of supply chain development.

Public-Private Partnerships

Government support might take the form of a public private partnership in a supply chain. Public-private partnerships aim at win-win situations and is thus beneficial for the society at large and for private sector entities (van der Meer, 2000). Public-private alliances are generally defined in contractual relationships in which the partners agree to cooperate in pursuit of a common goal. Contributions are made on both sides and risks are shared (as in the cases of South Africa and Thailand described in section 4).

The public research institute might contribute by developing and testing new technologies, tools, models, and instruments to improve the performance of the supply chain, usually financially supported by government. The private firms can access this knowledge. As such, public research is driven by private-sector demand; it facilitates the private sector's access to knowledge and, in

tandem, fosters private-sector development. Government's role in public-private partnerships can be as co-financier of a supply chain project (Australia, Canada, the Netherlands, Thailand and South Africa, see figure 5 and Box 2), as creator of an enabling environment (e.g., through provision of research and physical infrastructure) and as mediator in trade negotiations (Newton, 2000).

Box 2: The Agri Chain Competence Center

ACC supports public-private partnership in supply chain projects. ACC's goal is to improve the competitive position of agro-industry by stimulating the development and utilization of supply chain knowledge. ACC initiates pilot projects in which private companies collaborate with research institutes to develop and implement innovative chain concepts. ACC activities fall into five categories:

Raising awareness about the supply-chain approach and about the importance of public-private partnerships

Connecting chain partners to develop pilot projects related to supply chains

linking private and public parties to jointly tackle specific chain problems

Co-financing or seeking funds to develop pilot projects

Disseminating experience and knowledge gained in pilot projects through the Internet and publications

ACC assists the private sector, governments, and research institutes in jointly creating an enabling environment for cross-border trade opportunities, linking these partners to reduce bottlenecks. In many areas, such as food safety and applied technology, various forms of public-private cooperation are found to be necessary and co-funding is usually desirable.

International organizations

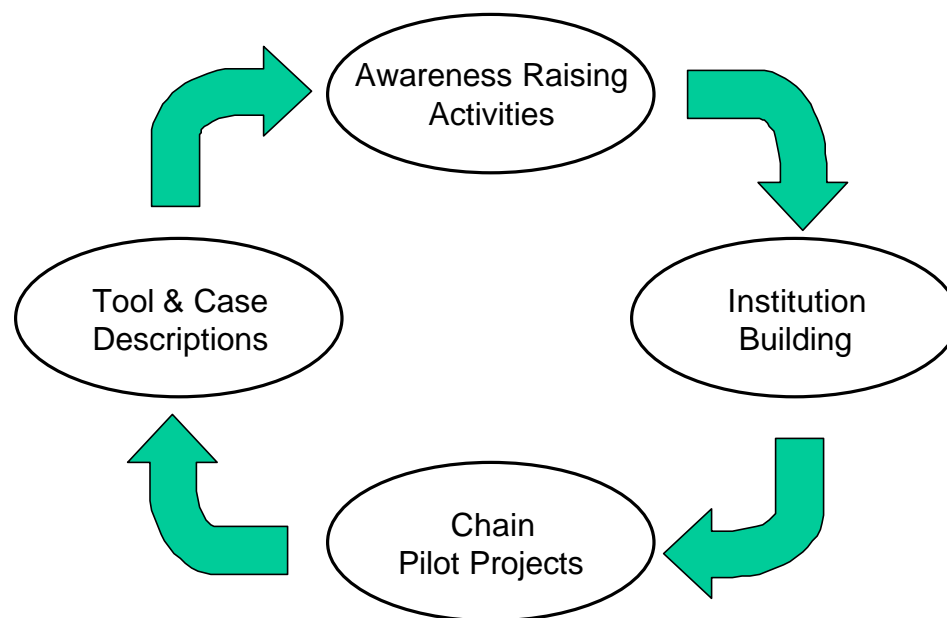
International organizations such as the World Bank, World Trade Organization, Food & Agricultural Organization, international research institutes, etc. can assist national governments of developing countries and emerging economies with special and sustainable public interventions to upgrade cross-border trade. These interventions can include national strategy for the development of the private sector, implementation of trade policies, institutional capacity building, analysis of particular agro-systems, supply chain analysis of particular products, training courses in supply chain development.

The international organizations can also stimulate public-private partnerships by linking national and international research institutes, governments and the private sector to jointly tackle obstacles for cross-border trade and to benefit from opportunities.

Developing cross-border chains

As has been indicated, different stakeholders play an important role with the developing of cross-border supply chains (private companies, government, research institutes, international organizations and public-private initiatives). Figure 6 portrays the four types of activities that can be undertaken to foster supply chain development by these stakeholders:

- awareness raising to gain stakeholder involvement in the (emerging) chain
- institution building, encompassing both public and private partners
- pilot projects, to provide insights and expertise
- tools, by which experience and knowledge are disseminated to stakeholders

Figure 6: Cycle for supply chain development.

Raising Awareness

Experience shows that seminars or workshops are effective ways of bringing agencies of the public sector together to learn about the opportunities and issues involved in supply chain development. These agencies meet to identify and discuss trade opportunities for their country in the global market, as well as potential benefits to society, such as generation of employment and income for the rural poor. Awareness raising seminars like these have been organized for government employees in Thailand and for policymakers in eastern Europe.

Awareness raising can also be undertaken among partners who have decided to collaborate in a supply chain. Seminars, for instance, provide opportunities for the partners to get acquainted and build up relationships. Chain partners discuss bottlenecks, opportunities and their future roles in the supply chain as they exchange information about their own situations. Research institutes and governmental agencies take part in these discussions and cooperate in a search for the best supply chain solutions.

Institution Building

Institutions that stimulate supply chain development are essential since the development of supply chains is complex and requires knowledge about chains and within chains. In many countries, these institutions do not exist or are very weak. Strengthen existing public institutions or creating new ones may enhance public and private parties' ability to solve supply chain problems jointly.

The institutions act as intermediaries and recognizes the common interest of an entire sector of the economy and that is familiar with the areas of competence of research institutions and

universities in this field. This intermediary plays an important role in the establishment of public-private partnerships. It stimulates demand for knowledge, assist in formulating research questions, match demand and supply for knowledge, disseminate lessons learned and fund (part of) chain pilot projects and programs (see also box 2, page 13).

Pilot Projects

In pilot projects, partners collaborate to identify and solve problems in their supply chain. Section 4 of this paper describes three such pilot projects. ‘Learning by doing’ and ‘learning from best practices’ are common methodologies in such projects. Chain partners discuss and analyze their operations looking for practical ways to, for example, reduce costs and improve food quality and safety. Information is also disseminated, for example, on new technology and know-how and on means to improve collaboration among chain partners.

Best practices from other regions and agri-chains can provide insight into best approaches for solving particular problems or to ways of benefiting from new opportunities. Best practices derived from pilot projects have shown partners how they might improve quality, certification, logistics (reduction of lead-time and storage), information exchange, consumer responsiveness and innovation.

The pilot-project approach should preferably be bottom-up. Initiatives for improving vertical chain coordination should come from the (potential) partners in the chain, to increase the chance of their being implemented in practice. A typical pilot project lasts one to three years and consists of a four-phase cycle of orientation/analysis, definition, implementation, and monitoring and evaluation.

Toolkit

Pilot projects are market-oriented, to ensure that supply chain activities are adapted to consumer demands. By executing projects systematically, experience gained can be compared and tools developed for application in other supply chains³. Experiences and knowledge can be translated into case descriptions (as in section 4) and into tools and materials for training courses and seminars (appendixes 1 and 2). Best practices can be distilled into lists of ‘dos and don’ts’ for projects to improve the workings of supply chains.

By collecting different tools into a ‘toolkit’, knowledge about specific issues in chain development can be made available in far-off markets. The pilot project in Thailand (detailed below) developed four such tools; namely, a certification system for food safety assurance, a value-chain analysis model, a model for lead-time reduction and a preferred supplier development tool. A training course was also developed for professionals and operators working in agri-supply chains (annex 2).

³ The set-up and execution of supply chain projects is described in the World Bank’s guide to developing agricultural markets and agro-enterprises, *Building Agri-supply Chains: Issues and Guidelines*, published in 2002.

Examples of Food Supply Chains

This section describes three cases of cross-border supply chain development in the food industry. Each case highlights background, objectives, approach, position of the smallholder and cooperation and the development process. Table 2 sketches the chain issues that each of the three cases addresses.

The first case, Ghana's processed fruit supply chain, shows that moving value-added activities to a developing country can benefit local private firms and communities by providing jobs, know-how and increased foreign export earnings. Furthermore, the case demonstrates that, contrary to conventional belief, small-scale farmers are able to implement a code of conduct based on EUREP-GAP. Although private initiative is important in this example, the case also shows what complementary tasks remain for local public institutions and international donor agencies.

South Africa's fruit export sector provides insight into a process of improving the exchange of information on logistics and product quality. The context is trade in fresh fruit between parties in South Africa and the Netherlands. Both public and private partners are involved in the project.

The third case, fresh food supply chains in Thailand, shows how an international retailer controls the organization of a supply chain in order to guarantee the quality and safety of the products it sells. In this case, a project was set up to optimize the supply chain with a focus on integral chain care, in which quality and safety assurance is the focal points.

Table 2: Chain issues addressed in three chain projects.

	Ghana	South Africa	Thailand
Knowledge about Chains			
Chain Strategy	X		
Chain Formation	X		X
Chain Organization	X	X	
Chain Design			X
Chain Management	X	X	X
Partnerships	X	X	X
Knowledge within Chains			
Chain Marketing	X		
Chain Logistics		X	X
Quality Assurance	X		X
Information Flows	X	X	
Added Value	X		
Technology		X	
Integration		X	X

The Ghanaian Processed Fruit Supply Chain

Background. Imports of vegetables, fruits, nuts and cereals from developing countries into the European Union amounted to more than €8 billion in 1999 (Buurma et al., 2001). Developing country producers face increasing difficulties in meeting international standards for quality and food safety. Moreover, many multinational food chains are creating and implementing their own standards for quality and safety. Retailers created the EUREP-GAP code, for example, to ensure product quality. Smallholder producers, due to their limited resources, are at a disadvantage in accommodating such requirements for quality and safety guarantees and certification.

Objectives. The company Blue Skies was formed in 1997 and started to produce processed tropical fruits for the international market in Ghana early 1998. Shortly thereafter, the company initiated a supply chain management project aimed at improving the quality of its processed fruit. One task was to take a hard look at the organization of the processed fruit supply chain. The result of this analysis was the company's decision to move some processing activities to Ghana, to the benefit of both the enterprise and the local community (in the form of jobs). The move brought more value-added activities to the country, and the quality of the product was also improved, as the processing was brought closer to the growing area.

Since Blue Skies follows 'triple-E' business principles (ethics, ecology and economy), the project also implemented a code of behavior for social responsibility, protection of the environment and good agricultural practice.

Approach. Blue Skies initiated and guided the project development process, translating European market opportunities into a strategic business model for the Ghanaian supply chain partners. Quality of processed fruit and the entire production process is now guaranteed through an integrated approach to supply chain management 'from farm to fork'. Some 30 smallholders, large-scale producers and their out-growers supply fresh fruit to the processing factory.

Noteworthy outputs of the project include the following:

- implementation of EUREP-GAP code of practice by all chain partners within 24 months
- development and implementation of a trusted third-party certification scheme by all chain partners within 24 months
- added value to raw materials in the country of origin
- substantial export flow to upper-end market segments in various European countries
- signed agreement of fruit suppliers on farm audits and approved pesticides for each crop
- staff of the processing factory (250 local employees) trained to assemble, prepare and dispatch fruit according to HACCP principles
- development of a quality manual for certification
- experience gained by Ghana's public-sector research institutes about implementation of EUREP-GAP codes by smallholders

Position of the smallholder. Commitment, enthusiasm and preparedness to conform to EUREP-GAP principles among Blue Skies' farmer-suppliers were crucial for the Ghanaian partners to capitalize on market opportunities within the processed fruit chain. Although the processing factory has a portfolio of suppliers, ranging from smallholders to large farms, they consider smallholders their best partners. The smallholders tend to be more committed and eager than the larger farms, which invariably have other export clients.

The processing factory made major investments in the certification program and gave smallholders the opportunity to invest in their production system. Participants in the certification

program covered the costs of all central activities: consultancy fees, registration costs, training costs, and subscription. Farmers borrowed money from Blue Skies to pay for investments in buildings, protective clothing and sanitary facilities. Blue Skies charged no interest on these loans and allowed reimbursement over two years, which meant that Blue Skies actually paid half the cost of the project given exchange-rate changes.

Cooperation and the development process. The food processing company has developed close links with a broad range of public and private partners. Each makes its own contributions to the chain project: providing help and assistance to farmer-suppliers in the form of agricultural education and advice, developing a sound transport and logistics infrastructure, developing resilient and suitable packaging processes and implementing quality management systems.

The public partners and international centers of expertise participated in the design of the project and implementation of the code of conduct on good agricultural practices with the fruit suppliers and the processing factory. The Natural Resources Institute conducted research on the ethical component of the EUREP-GAP code. Agro Eco provided assistance in the development of a quality manual to support the certification procedure; and the Ghanaian Plant Protection and Regulatory Services provided additional training on pesticide applications, calibration of spraying equipment and appropriate farming practices. Blue Skies motivated commitment from the private partners by offering economic incentives and creating a corporate culture in which empathy for local values and attitudes plays a central role.

South Africa–The Netherlands’ Fresh Fruit Supply Chain

Background. South Africa’s fresh fruit industry has experienced tough times recently due to the 1997 deregulation of the export system. Competition increased and prices dropped. These developments prompted the stakeholders of the sector to undertake a feasibility study on optimization of the cold fruit supply chain between South Africa and the Netherlands, a major trading partner. The study was conducted in 2000 with farmers, fruit cooperatives, private companies and knowledge institutes from both countries. It found that lack of accurate information on logistics flows and quality aspects of the fruit was a problem common among all the chain partners (from farmer to retailer). To address the problem, the partners initiated an information system development project to enable them to monitor product flow from country of origin to market.

Objectives. The first objective was to assess the potential benefits and costs of an integrated supply chain information system. The South African information and communication technology provider Paltrack had already developed a system used by South African authorities to record the quantity of all fruit exported from the country. The aim of the fresh fruit supply chain pilot project was to extend this information system with logistics and quality data for fruit from South Africa destined for the Netherlands.

Approach. Three existing distribution chains for fresh fruit exports from South Africa to the Netherlands served as models in the project. Participating research institutes gathered information from these private companies via interviews. Questions focused on how information on logistics and produce quality was exchanged from farmer to retailer and on specific requirements for additional information on these two aspects. The researchers analyzed the three distribution chains separately to ensure confidentiality of chain information.

A number of project outputs are worthy of note:

- collection of data to extend the 'Agrihub' information system for each of the three chains
- generic modeling of a supply chain information system for fruit which can be used or adapted by other supply chains
- ideas for improving information exchange between chain partners
- suggestions for farmer-level improvements concerning harvest and post-harvest activities
- suggestions for cooperative/exporter-level improvements regarding quality-control practices, feedback to farmers and standardization, for example, of shipping pallets
- suggestions for government-level improvements such as investments in fruit sector infrastructure (packing houses, transport, harbor), quality control and research facilities
- dissemination of results in workshops, conferences, publications and Web sites

Position of smallholders. Smallholders obtained access to information on logistics and quality as a result of this project. Producers were thus better able to adapt their production, harvesting and post-harvest plans to export activities. The smallholders also received information on how to improve the quality of their produce. Increased information exchange among all the chain partners increased market opportunities for the partners, as improved logistical organization of the chain improved the quality of its produce.

Cooperation and the development process. Both private and public parties participated in the project. Some of the private companies involved were motivated to participate because their competitor did so or to make sure that they did not miss out on market advantages or innovations.

The participants appointed the research institute that had executed the feasibility study as project coordinator. The coordinator, thus, already had good insight into the sector and knew the partners involved. In addition to dealing with day-to-day activities, such as administration, the project coordinator also responded to information requests and solved problems such as misunderstandings and disagreements among project participants.

One representative from each participating organization served on the project steering committee, which worked via a videoconference between South Africa and the Netherlands once every three months. The committee's task was to approve project activities, monitor project performance and act on new developments within the supply chain. The participants apparently valued these meetings, since most were present at all. The atmosphere of the meetings was open and positive and even competitors chatted amicably before and after the official business. Because participants had signed clear agreements on confidentiality, intellectual property rights and information dissemination to the 'outside world', no significant problems arose concerning these issues.

The cost of the project was covered by the private-sector participants, who contributed cash and staff time, the research institutes, which contributed staff time, and by SANTF (the South Africa–Netherlands Transport Forum), the Dutch agricultural ministry, the Rotterdam port authority, and KLICT (a program that facilitates supply chain development for the Dutch government). Public-sector contributions reflected the two countries' commitment to private-sector development and, therewith, to economic growth on both sides.

Fresh Food Supply Chain in Thailand

Background. Thai consumers are spending an increasing proportion of their income on fresh fruits and vegetables, the percentage having risen from 19% in 1985 to 24% in 1993 (Itharattana, 1996: 18). Most produce is sold in traditional market outlets, in ambulant street trade and in the so-called 'wet markets'. Overall, 5% of sales are made through supermarkets, although this proportion has already reached 50% in the capital Bangkok. In recent years, international retailers

like 7-Eleven, Royal Ahold, Tesco, Makro, Carrefour and Sainsbury have established supermarkets especially to serve Thailand's urban conglomerates. In 1996, Royal Ahold established a joint venture with the Thai Central Retail Corporation and started to operate more than 30 TOPS supermarkets (most of which are located in Bangkok and Chiangmai). From the start, TOPS proliferated itself as the supermarket chain for quality fresh food.

Objectives. In 1998, TOPS began a supply chain project aimed at providing Thai consumers high-quality, safe, fresh produce with reliable availability at affordable prices. To achieve that goal, however, the supply chain faced a number of problems. For example, roughly 250 suppliers were delivering perishables directly to the backdoors of 35 stores at least three times a week. This meant high handling costs, significant post-harvest and shrinkage losses and low service levels (meaning that produce was often out of stock).

TOPS enlisted public-sector assistance and started the project with four objectives: raising the level of service within the perishables supply chain; reducing lead times and post-harvest losses and shrinkage; improving quality and safety of produce by developing preferred supplier relationships and introducing good agricultural practices and a certification scheme; and raising the knowledge and awareness of employees and professionals in the local food industry through on-the-job training (e.g., in HACCP) and a mini-MBA program.

Approach. The TOPS supply chain has thus far focused on delegating value-added activities and selecting preferred suppliers. Since at the start of the project none of the fresh-goods suppliers performed the value-added functions required (e.g., sorting, washing, packaging), the project decided to build a fresh distribution center that would also perform productive functions like quality control, washing, packaging and processing. This value-added center was a complete green-field operation located on the edge of Bangkok. The center served as the locus for the project's work to improve supply chain performance for perishables.

A number of noteworthy results were achieved:

- establishment of the fresh distribution center in Bangkok
- reduction of the number of preferred suppliers from 250 to 60 in the first half of 2001, with 40 out of the 60 certified by the Department of Agriculture (DoA) and carrying the DoA label
- provision of training to quality control managers at the TOPS distribution center and in the stores, with the service level increasing to 98%
- development of a 'road map' – in other words, a practical blueprint – to achieve trusted third-party certification for food safety assurance in emerging fresh markets (see annex 1)
- development of a value-chain analysis model
- development of a model for lead-time reduction
- guidelines for a mini-MBA program on supply chain management (see annex 2)
- reduction of the lead-time from farm-to-fork from 68 hours to less than 24 hours
- reduction of post-harvest and shrinkage losses
- during the chain optimization process, standardized crates, pallets and crate washing facilities were introduced. The TOPS standard was accepted by most major players in the Thai retail industry (including leading suppliers)

Position of the smallholder. Smallholders are involved in the TOPS supplier network in two ways: first, via the network of contract farmers and buyers who are preferred suppliers because of their ability to exert backwards control on the supply chain and, second, via the recent phenomenon of informal farmers' associations. In these associations, professional growers within a family or village join forces and exchange experiences and farming knowledge. These groups

seem to meet all the preconditions for developing into full-fledged growers' associations and engaging in long-term direct business relationships with retailers.

Cooperation and the development process. Between 1998 and 2002, the emphasis of the supply chain development strategy gradually changed from chain optimization (reducing post-harvest losses, shrinkage, handling costs) to integral chain care (HACCP, good agricultural practices, certification). Chain partners established cross-border public-private alliances with international research institutes and ministries of agriculture to find ways to increase food safety assurance and improve certification, as well as to strengthen research and education capacity about and within the food chain. The project became affiliated with the Department of Agriculture's certification program to increase public awareness and gain trust and to build the image of a reliable and responsible retailer. Chain leadership was in the hands of the retailer, the supermarket, which prioritized the interventions and set the pace for the process of change.

The main challenges the project encountered concerned intercultural barriers. For example, the preferred supplier program ran up against the traditional Thai system of personal networks in agricultural trade. Buyers and suppliers customarily maintain personal relationships to create stability and continuity in trade, despite the fact that this is not always economically efficient. Consequently there has been some resistance to optimization of the supplier network. However, the project has helped to convince many participants that the implementation of the preferred supplier program is required to improve the supply of perishables.

Also, the chain partners sometimes experienced intercultural communication barriers. More than once the straightforward western style ('what you see is what you get') collided against the Asian style of not showing or expressing thoughts and feelings. This resulted in delays and postponements but also contributed to a growing mutual understanding.

Factors for Success and Risks

This section describes some factors for success and risks for cross-border supply chain projects. From the concepts and cases presented we identify the following *success* factors for cross-border supply chain projects in developing countries:

- Development of trust, commitment and transparency among partners improves communication and information exchange.
- Awareness raising activities provide chain partners the opportunity to get acquainted and build up relationships.
- Chain partners jointly plan and control the flow of goods, information, technology and capital.
- Implementation of 'integral chain-care' concepts through a close collaboration among the chain partners.
- Development of models, tools, training material, etc. to tackle bottlenecks in the supply chain.
- Knowledge-dissemination tools can spread the insights and experiences gained in pilot projects.
- Certain aspects of chain development (e.g., food safety and social accountability) touch upon the responsibilities and mandates of both public and private agents. Public-private partnerships seem indispensable in these areas.
- Initiative and leadership of a private company in a chain project is important for continuation of the activities.

- Leadership should not by definition be concentrated within one company in the chain, as different chain partners can be leaders in different areas, such as logistics, marketing, etc.
- The number of chain partners participating in the project should be limited to ease the difficulties of partners having to switch from a product orientation to a market orientation.
- Power should not be concentrated in one chain partner, as dominance by one partner in the supply chain may prompt other partners to conceal information.

The following factors are *risks* that endanger the development and success of cross-border supply chain projects in developing countries:

- Social and cultural differences between persons, companies and countries can lead to misunderstandings and miss-communication between chain partners.
- Hidden agendas of individual companies within a supply chain may hinder overall progress in the supply chain project.
- Supply chain strategies are often set high in the hierarchies of the different chain partners. If these strategies are not translated into incentives at the operational level, conflicts within a company or among chain partners may result.
- Chain collaboration is often based largely on the commitment of one or a few persons within a company; supply chain knowledge is, in most cases, vested in these individuals. When such persons leave the company and the network, the knowledge is also lost.
- Tightening trade regulations imposed by governments and retailers stifle trade between chain partners who have long-established relationships.
- Selecting preferred suppliers entails disqualifying others. Often smallholders become unable to supply high-end supermarkets.

Public and Private Responsibilities

In the day-to-day reality of business, supply-chain formation is not about creating equality between trade partners, but about creating sustainable and interdependent relationships. The private sector should have the lead in creating viable supply chains.

The government plays an important role in cross-border trade. Governments have a two-fold responsibility. The first is to create a good climate for private investment in supply chains. The second is to create an environment in which the poor and smallholders can gain income, employment and reliable supply of consumer goods through supply-chain development. This can entail that governments provide the poor with access to resources and reduce market failures that are obstacles to the poor.

This paper has indicated that both parties, private and public, bear responsibilities for cross-border supply chain development.

Appendix 1: Tool for Food Safety Assurance and Certification

Introduction

This tool, a ‘road map’ to trusted third-party certification for food safety assurance in emerging fresh markets, was derived from experience gained in the Thailand pilot supply chain project discussed in section 3 of this paper. It proposes a step-by-step approach to safety assurance linked with a methodology called the SGS franchise model. The tool has already been applied in various countries.

Trends in culture and science are increasing consumers’ awareness about food safety. Demand is mounting for demonstrably safer food as consumers become more affluent, live longer, and better understand the links between eating and health. At the same time, scientific research is identifying new food-borne pathogens and their potential to compromise health (Unnevehr and Jensen, 1999). Furthermore, as globalization reduces technical and commercial barriers to trade, international markets for food products become a significant source of supply, and new sources of risk enter the food chain. The proportion of food obtained from food services is also increasing even in middle-income countries. Consumers are thus relinquishing control over food handling and preparation. While these trends converge to create consumer demand for greater assurance of food safety, governments everywhere are trying to make more efficient use of public resources. This has led to a rise of food safety systems that focus on verifiable monitoring of the agri-supply chain.

The project

When the multinational Royal Ahold and Thailand’s Central Retail Corporation started their joint venture in 1998, their TOPS supermarket network was facing severe quality and safety concerns in the fresh produce category. Especially in fruits and vegetables, high levels of agrochemical residue were found on the produce delivered. Even outlawed chemicals like DDT were found to be present, and for permissible agrochemicals, residue levels were far above the MRL values established by the World Health Organization and the Food and Agriculture Organization of the United Nations (set in the *codex alimentarius*). Furthermore, consumers were generally unaware of the origin of the produce they bought. There was no means of tracking and tracing the goods. Farming practices and quality and safety measures taken along the supply chain were unknown to the retailer (if they existed at all).

The TOPS food safety assurance program was developed as a public-private management tool to ensure the safety of fresh produce. It replaced the ‘end of the pipe’ checks done through product sampling and testing, which was expensive and rarely provided timely results. The new approach is likely to be accepted as a national standard in Thailand by other leading players in the Thai retail industry and agro-businesses. It is based on an incremental process. Measurable indicators include zero-tolerance of residues of agrochemicals outlawed by Thai law as a first-phase target and, subsequently, the codex MRL values.

The Road Map

The road map is a practical blueprint that firms can use to design and implement food safety assurance programs. By following a sequence of steps, the blueprint covers all crucial aspects of food safety assurance. Each step starts with a text box that illustrates the lessons learned in the Thailand pilot case and other relevant cases. Some steps also contain a checklist or list of questions that actors must address when implementing a food safety program.

The road map starts by posing seven crucial questions:

- Which supply chain partners are willing and able to start a joint program?
- What are the priority products for food safety assurance and certification?
- What farming systems provide the highest chance of success in guaranteeing food safety and meeting certification standards?
- What certification methodology suits your needs?
- Which organizations could be certification project partners, both public and private?
- How will certified safe products be distinguished from others (e.g., use of labels, hallmarks, certificates)?
- How can you make safety assurance a continuous improvement effort?

The structure of the roadmap reflects the questions above: (i) main supplier approach, (ii) product selection, (iii) farming system analysis and selection, (iv) product versus process certification, (v) public partner selection and division of tasks and responsibilities, (vi) performance and function of quality labels and certificates, (vii) continuous safety improvement.

Appendix 2: Tool for Knowledge Development

Introduction

Local knowledge infrastructure is key to developing agri-supply chains. Yet knowledge infrastructures are often weak or lacking in developing countries. For that reason, the Thailand project developed a supply chain management training course tailored to its needs. The course provides an excellent opportunity to develop a training formula or 'tool' for organizing such courses for other regions or supply chains.

The course is designed as an introduction to the philosophy and methodologies of supply chain management. It is generic in character and relevant for professionals working at various levels of the food supply chain, including providers of agricultural inputs, primary producers, processors, and logistics and retail managers.

Training Inputs

The bricks and mortar of the training program consist of four components:

- **Theory.** The latest research and training materials in the field of agri-supply chain development are collected and presented by professors from both local and international universities.
- **Case studies.** Practical business problems and solution strategies are derived from situations facing real companies in Thailand and presented by company representatives.
- **Multi-disciplinary approach.** Both trainers and training materials represent various disciplines, including logistics, accounting, marketing and food safety and quality assurance.
- **Interactive group work.** Unlike regular education based on lectures, this training emphasizes interactive work in groups.

The Curriculum

The Thai curriculum addresses a number of important business problems, such as the limited awareness of and responsiveness to consumer concerns among staff and supply chain partners. There is also a lack of trust and mutual understanding in contentious chain partnerships, like that between buyers and suppliers. Further curriculum development will incorporate findings from new supply chain projects in the region. To guarantee the sustainability of the program, curriculum development is embedded in Thailand's efficient consumer response (ECR) platform.

The training tool was designed in a guideline format that can easily be adapted for specific supply chain management courses. The guide covers the crucial aspects of the training in a sequence of six steps:

1. **Design of a tailor-made supply chain management course.** Training as a component of knowledge management. Designing a course. Balancing theory and practice. Linking a supply chain project to the training.

2. **Developing a curriculum.** Creating a demand-driven design/needs assessment among target groups. Knowledge exchange and knowledge transfer/training trainers. Training methodologies (business cases and participant action plan approach).
3. **Establishing partnerships.** Linking knowledge demand to knowledge supply. International training (and research) partnerships. Public-private partnerships.
4. **Attracting trainees.** Using the bandwagon effect. Creating and using networks (business associations, ECR initiatives).
5. **Planning, implementing and evaluating the course.** Timing. Creating a communication platform. Organization. Nominating a steering committee.
6. Legal, contractual and financial frameworks. Evaluations.
7. **Benefiting from public relations.** Media selection. Press releases. Roundtable discussions.

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