Abstract: Integrated supply chains are one of the most powerful competitive tools in today's globalizing business economy. For agricultural products, successful supply chain development projects reduce not only the transaction costs but also the institutional barriers that decouple individual links in traditional distribution channels. They allow participants to achieve higher levels of service and to capture substantial added value thereby serving as leverage points both for economic growth and for poverty alleviation. This paper also draws on the experience of the Agri-Chain Competence Center to discuss the critical issues and step-by-step actions necessary to stimulate and support the emergence of supply chains in developing countries.

I. Introduction to Supply Chains

Supply chains are complex entities that serve many functions. They are institutional arrangements that link producers, processors, marketers and distributors. Supply chains are forms of industrial organization which allow buyers and sellers who are separated by time and space to progressively add and accumulate value as products pass form one member of the chain to the next (Hughes, 1994, Fearne, 1996, Handfield and Nichols, 1999). Supply chains are the conduits through which (cf. Cooper et al., 1997):

♦ products move from producers to consumers;
♦ payments, credit and working capital move from consumers to producers;
♦ technology and advanced techniques are disseminated among producers, packagers and processors;
♦ ownership rights pass from producers to processors and ultimately to marketers;
♦ information on current customer demand and on retail level product preferences pass back from retailers to producers.

Agri-supply chains are also economic systems which distribute benefits and which apportion risks among participants. Thus, supply chains enforce internal mechanisms and develop chain wide incentives for assuring the timely performance of production and delivery commitments (Iyer & Bergen, 1997, Lambert and Cooper, 2000). They are linked and interconnected by virtue of shared information and reciprocal scheduling, product quality assurances and transaction volume commitments. Process linkages add value to agricultural products and require individual participants to coordinate their activities as a continuous improvement process. Costs incurred
in one link in the chain are determined in significant measure by actions taken or not taken at other links in the chain. Extensive pre-planning and co-ordination are required up and down the entire chain to effect key control processes such as forecasting, purchase scheduling, manufacturing programming, sales promotion, and new market and product launches.

**The advantages for supply chain members**

Individual suppliers, producers and marketers who are associated through a supply chain coordinate their value creating activities with one another and in the process create greater value than they can when they operate independently. Motives for collaboration between supply chain participants have been elaborated in detail (cf. Mahoney, 1992, Giupero & Brand, 1996, Gattorna, 1998). Supply chains create synergies in one of three ways: i) they expand traditional markets beyond their original boundaries and thus increase sales volume for members; ii) they reduce the delivered cost of products below the cost of competing chains and thus increase the gross margin for the working capital committed by members of the chain; and iii) they target specific market segments with specific products and they differentiate the service, product quality or brand reputation of the products they deliver to these market segments and thus increase consumer perception of delivered value. In this way, they allow chain members to charge higher prices.

Generally, however, supply chains increase market contestability both at the producer end and at the consumer ends of the chain. At the consumer end, chains compete primarily through price, differentiated products and services and differentiated terms of sale. At the producer end of the chain, supply chains compete with one another primarily for "producer affiliation" and core vendor commitments.

"Producer affiliation" implies a long-term relationship between producers and other members of the chain based on process integration, stability in supply, and greater investment in efficient integration into the chain. Rather than unaffiliated "arms length transactions", supply chains substitute intra corporate, contractual or franchise affiliation thereby enabling them to transfer risks among participants in the chain. In this way, supplies chains effect and progressively increase comparative advantage based on specialization among chain partners.

Many producers in developing countries can benefit by joining supply chains. Indeed only through chain affiliation can many producers determine whether they will target their production for upscale, product differentiated markets or down scale, commodity markets. Agile and innovative agri-supply chains allow producers to improve their gross margins, increase their savings from cash crop sales and adapt their products, value adding processes and channel alignment to dynamic market circumstances. Competition among chains for the best producers allows producers to rise above a price taking relationship and to affiliate strategically with chains.

The forms of association among supply chain partners are various and may include corporate affiliation, contractual affiliation, membership in a trading community, membership in a producers cooperative, etc. Well-designed supply chains are capable of realizing several kinds of captured value for their participants. For example, they assure:

i) through quality control that exacting product requirements (e.g. eco certification) of retail customers can be met or exceeded in each step within the chain,

ii) through innovation in product, in production/ distribution processes and in chain alignment that individual chains compete successfully with other chains based on superior product quality,
price-to-value, value-to-cost and, importantly, logistics innovation and that the chain itself continuously adapts in its design, component competencies and market feedback systems to dynamic market requirements;

iii) through the compression of the order-to-delivery cycle, improved demand forecasting, quicker supply response and 'strongest link' financing of the entire chain that working capital required to produce and deliver marketable products to end consumers is minimized,

iv) through risk management that production/delivery/sale risks are allocated efficiently both among chain participants based on their capacity to manage specific risks and to third parties when chain participants cannot effectively manage specific risks;

v) through competitive chain management that the value premises which underlie the chain’s design are continuously tested, validated and adapted to changing circumstances.

The impact of agri supply chain affiliation

Customer oriented cross-border agri supply chains have an enormous reciprocal effect on each of the successive companies involved in the chain. The following lessons can be learned from successfully implemented agri supply chain projects:

- Long term relationships between partners in the chain, lead to improved margins and improved market knowledge for the primary producers (growers and farmers);
- Reduction of product losses during storage and transportation, result from optimal co-ordination of the successive activities in the chain;
- Quality and/or freshness of products can be improved greatly;
- Improved safety of food products can be assured;
- Sales can be increased significantly, due to exchanging market information;
- Coordinated supply chains tend to generate "high value added" products that generate considerable revenue as they match with the demands of high-end markets and high income segments.

II. Key issues in agri supply chain development

Driving forces for agri supply chain development

Saturation of OECD food markets and changing consumer demands, powerful application of information and communication technologies (Lancioni et al., 2000, Venkatraman, 1994, Davenport, 1993) and the internationalization of the agri-industrial sector are the major driving forces affecting supply chain development and forcing the strategic realignment of traditional buyer/seller relationships along the chain. Moreover, consumer demands with respect to the ecological and socio-economic sustainability of agricultural production and to issues of food safety are coming more and more to the fore.

In order to survive in this highly competitive environment, distribution/production companies must respond to these challenges:

- How can agri-industrial organizations (including farmers and growers) in developing countries gain and maintain insight into changing consumer demands -- both consumer
demands on local markets as well as on international markets -- and how can they respond to these demands dynamically?

- How can food safety be guaranteed, what are the international quality standards for agri-industrial products and how can quality of food products be maintained during primary production, processing, distribution and storage?

- How can production processes in developing countries be organized in such ways that added value can be maximized, in order to strengthen the international competitive position of companies involved and to strengthen the economic structure of the country?

- How can producers in developing countries benefit from applications of sophisticated logistics management methods that continuously increase the velocity with which products move through distribution channels as buyers look to pull the precise mix and volume of products through their channels?

Dealing with these challenges exceeds the capacity of most single companies. Moreover many opportunities exist for partnerships in the form of (cross-border) agri supply chains. Experience demonstrates new markets and new market segments new products and new services can best be developed through partnerships among suppliers, input providers, marketers and customers in the chain. However, to take advantage of emerging opportunities investments are required.

Chain knowledge: a critical success factor

Developing agri supply chains is a complex task. In order to create and organize chains a good deal of knowledge and expertise is required: chain knowledge! Chain knowledge includes several interrelated types of knowledge: i) about product design and packaging; ii) about market requirements and customer preferences; and iii) about production/ distribution processes and their integration. Supply chains facilitate the sharing of all three forms of knowledge among chain participants.

Knowledge about chains concerns the functioning of chains as a whole: How do companies go about developing a chain strategy? How can a chain be organized? Chain knowledge can help to integrate and interconnect production, distribution, processing and trade at each level of the supply chain. 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 the chain, like chain marketing, logistics, and information flows. Both fields of knowledge are integrated through the field of chain engineering that requires a general understanding of supply chain concepts but also demands a thorough insight into the crucial interrelated processes within the chain. Key concepts for supply chain development is partnerships and integration.

Sample strategies for agri supply chains

Depending on the local circumstances and requirements variations of three general strategies apply for organizing agri supply chains: chain differentiation; integral chain quality assurance; and chain process realignment.

a) Chain differentiation
Chain differentiation refers to setting up supply chains in order to respond to the demands of specific market segments. With the increasing choice of food products on offer, consumers in OECD markets and the urban middle class in emerging markets are continuously making new demands on food products and service, thus setting new demands on the suppliers of these products. Consequently, the chains of production must differentiate in order to satisfy consumer demands.

b) Integral chain quality assurance

Consumer choices are increasingly being determined by requirements in the area of quality and safety of food. Good Agricultural Practices and Integrated Pest Management are examples of such new standards. Development and implementation of integral chain quality assurance concepts in agri-supply chains together with suppliers and customers, and setting up tracking & tracing systems in chains enable agro-industrial companies and retailers to assure the quality and safety of food (cf. Ross, 1994, Jongen and Meulenberg, 1998). Supermarkets in countries like Brazil and Thailand have started Total Quality Management programs and apply Hazard Analysis at Critical Control Points (HACCP) rules for perishables and fresh products like fish and meat.

c) Chain process realignment

The reengineering of logistical operations within chains has become very important. In particular, the development of global operations by a number of companies often requires supply chain reconfiguration and process re-engineering. Markets are becoming increasingly competitive, with producers/suppliers seeking to avoid inefficiencies, and they are also converging, as business practices are benchmarked and replicated. It becomes necessary to seek sources of competitive advantage which are based upon cost reduction, cycle time improvement, postponement of value-added and asset productivity gains and customer value driven initiatives.

The general approach to supply chain development can be summarized in 6 basic concepts:

1. **Bottom up approach**: Vertical co-operation initiatives typically come from potential chain partners who are attempting to overcome specific obstacles or to solve specific management problems and who discover the power of chain leveraged solutions. Generally these will be at least two private companies who form contiguous links in a potential supply chain. Before setting up a supply chain project it is necessary to ascertain whether the proposed chain affiliation is commercially, technically, and politically feasible. These three issues strongly relate to the position of the business within its environment and the competitive advantage. Porter (1980, 1985) recognizes five forces that determine the competitive position and strength of a company: its suppliers, substitutes, new entrants, rivals and customers. Three generic strategies that can be derived from this are: cost leadership, differentiation and focus. A Value Chain Analysis can be used to assess the commercial and technical feasibility of the proposed chain relationship within the selected strategy. An appropriate tool to assess the political feasibility of a chain project is conducting a socio-economic impact analysis. Especially in emerging or transition economies, local governments can be worried or suspicious about the impact of new competitive partnerships upon the existing market order. Potential employment generation or losses, increased competition with local (state-owned) companies, and other effects need to be estimated in advance. Self-evidently, the impact analysis should be combined with a stakeholder perception analysis on basis of the assumption “perception is reality and opinion is truth”.

2. **Demand oriented agri supply chain development**: Customer demands should be the starting point for each new agri-supply chain design. Only those products that respond to consumer demands with faster, cheaper, better solutions, will be sustainable over the long term.

3. **Public-private partnerships**: The team of stakeholders that co-operate in a pilot project should ideally consist of not only representatives from the business community but also from universities and research institute. Depending upon the project, Ministries of Agriculture and Commerce, Food and Drug Administration and public agencies may also be actively involved. The private and public partners work together on the development and application of chain knowledge aiming at resolving bottlenecks in the chain and in developing a learning environment to facilitate education and training on these issues.

4. **Learning by doing**: It is important to work with partners on their worksite i.e. fields, warehouses, processing plants and offices. The hands-on experiences should be an integrated part of the overall knowledge management system, which includes knowledge development, knowledge dissemination, knowledge use and knowledge storage. The practical experiences that are generated within the chain can be supported by tailor made training courses in each of the supply chain development fields: chain differentiation (e.g. category management training), integral chain quality assurance (e.g. HACCP training), and chain process realignment or chain optimization (logistical training). **Strengthening chain knowledge infrastructure**: A critical success factor for supply chain competitiveness is knowledge infrastructure—in particular infrastructure that is able to support production, processing and trade at each level of the supply chain in an integrated way. Tailor-made training and education modules can be developed and added to existing educational programs (e.g. at MBA level). This means a vital structure in which the private sector and public knowledge infrastructure co-operate effectively and continuously in the field of chain knowledge.

5. **Synergy and progressive alignment** Knowledge development is accelerated through the process of gaining initial market acceptance. Winning early operational successes helps lock in partner commitments. In practice we see various stakeholders making individual efforts to effectuate supply chain performance improvements. At various levels of the upstream and downstream supply chain stakeholders work on quality and safety issue. Coordinated efforts between seed companies that successfully organizes training in the field of good agricultural practices and integrated pest management, and a retailer that sets up a certification program for safe and organic vegetables, can have a spin-off that is bigger than the individual separate pilots. The co-operation allows the retailer to communicate product specifications directly to the growers and guarantee the sales of the quality produce and the seed company on its turn can teach and monitor the correct farming practices and pre-harvest intervals and improve it seed sales. ACC-like organizations can contribute to supply chain knowledge system innovation by systematically gathering the case based information in a toolkit and provide this expertise for other future supply chain projects.

### III. Steps for agri supply chain development

**Analyzing chains**
The first step in agri supply chain development is analyzing the existing system:

- design a **map** of the existing commercial system and an analysis of its environment (the organization of the marketing system: product flow, exchange levels, facilities; forces affecting the operation of the supply chain system such as governmental policies, etc.).
- the analysis identifies potential supply chain players or stakeholders and delineates their function, role and relationships.

- the analysis points to the best suited chain leader. The explicit acceptance of chain leadership is very important for initial chain formation and strengthening.

- the analysis should measure the performances of the supply chain (according to criteria like: efficiency, flexibility, innovation, responsiveness, etc.). By international benchmarking of chains we can determine the present situation in the chain organization and compare it to the desired situation. With the help of benchmarking we can analyze different aspects of the supply chains and determine the critical success factors.

- The overall assessment can be concluded with a SWOT analysis which assesses the strengths and weaknesses of the supply chain organization and the opportunities and threats of the supply chain environment.

**Developing chain strategy and organization**

After the general analysis of the existing chain structures, it is important to identify possible project participants and define the general objectives. The possible project participants jointly define both the chain strategy and chain organization. When the chain strategy and organization are defined, the participants can focus upon the chain design, which will be undertaken in the actual pilot project.

**Steps for executing pilot projects**

Efforts to improve supply chain development should be based upon pilot projects that serve to identify and refine the most practical methods. A typical pilot project consists of a project cycle made up of four phases: Orientation/analysis; Definition; Implementation; Monitoring and Evaluation. By executing projects in a systematic way experiences can be gained, codified and compared with previous implementation projects in order to avoid pitfalls and save time. However well conceived and empirically tested, these general concepts, standards and analytical instruments still need to be adapted to local situations. The step-by-step approach for supply chain projects is described in Annex 1.

Redefining the role of government early in a supply chain project is essential. This means shifting the government's role from that of default supply chain manager to one of facilitator, rule maker and enabler of competing supply chain initiatives that emerge from the private sector. When the government or public sector, i.e. research institutes, assist in the development of chain knowledge, some key guidelines should apply:

- Decide upon project objectives jointly
- Design mechanisms to develop mutual trust and confidence
- Freely share information and develop learning networks Share or divide the responsibility and the profits
- Create and maintain transparency throughout
- Monitor and evaluate collaboration
- Build the institutions so that this research contributes to increasing research capacity and dissemination
- Design an exit strategy or the plan to scale up
Developing and implementing agri supply chains is a highly complex change process. At its most atomic level, agri supply chain development involves the re-calibration and realignment of interpersonal relations. Time and patience are required to build trust and to create commitment between the individual participants and mechanisms like workshops and trust building exercises can be very useful. Mutual trust is the fundamental prerequisite for building agri supply chains.

**Success and failure factors and monitoring advice**

There are a number of factors that are critical to the success of a supply chain partnership (Hughes, 1994, Bowersox, 1995, Gattorna, 1998):

- Selective matching; partners have compatible corporate cultures and values;
- Information sharing; partners openly share strategic/operational information;
- Role specification; each party in the partnership knows specifically what its role is;
- Ground rules; procedures and policies are clearly spelled out;
- Exit provision; a method for terminating the partnership is defined.

Alliances have failed for reasons like; lack of senior management support, lack of trust, fuzzy goals, lack of commitment and lack of control. However, the integrity of participants, their honesty, and their continued efforts to improve the exchange process are important ingredients of the process as firms take incremental risks and invest more in the relationship (Larson, 1992).

Morgan and Hunt (1990) posit that relationship commitment and trust develop when firms attend to relationships by:

1. providing resources, opportunities, and benefits that are superior to the offerings of alternative partners;
2. maintaining high standards of corporate values and allying themselves with exchange partners having similar values;
3. communicating valuable information, including expectations, market intelligence, and evaluations of the partner’s performance; and
4. avoiding malevolently taking advantage of their exchange partners.

Program moments for self-reflections and for critical analyses of the process by stakeholders while it is still underway is essential to ensuring a good cultural and organizational fit. Disappointment about results or hidden agendas can easily frustrate the progress of a project. Indicators of progress should be clearly defined and regularly visited/updated. The conclusions of a self-reflection process or mid-course correction should be validated by programming “go-no-go” decisions into the process.

The project management should include a neutral project director and possibly a government representative. It is advisable to organize at least two board meetings per year to reflect upon the progress and to build in the processes and expectations that partners will inform each other on a regular basis concerning the day-to-day activities (i.e. project workspace/web site, a monthly project bulletin and minutes of meetings).

**IV. An example: The Thailand Agri Supply Chain project**

A Thai agri-supply chain project, begun in 1998, joined together a number of diverse participants: CRC Ahold Ltd (a retailing organization that operates 38 TOPS supermarkets in Thailand), PP Food Supply Co. Ltd., World Fresh Limited, Novartis (seeds and crop protection
divisions), Rabobank International, TNT Logistics, along with Thai and international research institutes. The Agri Chain Competence center (ACC) facilitates the project.

The ACC approach to Public-Private Co-innovation

Agri Chain Competence center (ACC) was organized as a joint venture between Dutch Ministry of Agriculture, Nature Management and Fisheries, the Wageningen Agricultural University and members of the Dutch agribusiness community. It was designed as a knowledge resource whose mission is to identify and disseminate best agri-chain development practices and provide opportunities for the Dutch agribusiness community. The specific mission of ACC is to strengthen agri supply chains in developing countries, improve their consumer response capabilities, redesign organizational structures, improve risk mitigation, and upgrade their technology base.

ACC carries out its mission by transferring best practices from where they have proved their effectiveness elsewhere in developing world. Their projects typically involve cross-fertilization among project participants and collaboration or outreach to the business community, universities, research institutes and relevant public agencies.

The first steps in the Thailand project were to elaborate on the existing problems within the fresh products chain, identify the participants of the project and define the ambitions and intentions of these participants.

Problem Analysis

The general analysis of the supply chain learned that customers had specific requirements for perishables that could not be met by the existing supply structure. These requirements include high quality (freshness), food safety, a broad assortment and good in-store logistics, high availability, and last but not least, an acceptable price. The analysis also revealed that the main problems of the existing fresh goods supply chains were the following:

- High price variability
- High losses and shrinkage
- Long order response time
- Insufficient quality control throughout the chain including shortage of refrigerated transport and storage
- A general lack of production planning and rigid or outdated production methods
- Insufficient ability to fulfill product specifications
- Lack of information flow into the whole chain
- No value added from specific trade mark strategies
- Lack of trust between stakeholders in the supply chain
- Coordination difficulties between many small suppliers

After gathering this information and defining the general objectives an action plan was elaborated for the project.

Definition of four main project objectives:

By matching the problem analyses with the consumer requirements it was possible to define four main objectives for agri-supply chain development:
1. **Quality and certification program.** Pesticide residue levels above the MRL standards of the Codex Alimentarius were a general threat to consumers’ health. The aim of this project activity was to set product specifications and standardization. At farm level growers had to be trained in applying “good agricultural practices” and all levels in the supply chain had to be trained in HACCP principles. The pilots were set up in close co-operation with the responsible government institutes for policy formulation, surveillance, and certification (e.g. the Food and Drug Administration, the Bangkok Metropolitan Authorities, the Ministry of Public Health, and the Department of Agriculture).

2. **Information systems.** There was a lack of transparent information across the entire supply chain concerning costs, margins and value added activities. Activity Based Costing was used as part of a monitoring system to identify bottlenecks and target improvement areas. The private agricultural input supplier provided data from the growers. At the retail store level this translated into a Direct Product Profitability system.

3. **Lead time reduction:** A functional distinction was made between the upstream part of the supply chain (from farmers to distribution center) and the downstream part of the supply chain (from distribution center to supermarket outlets). The lead times for perishables to the distribution center were up to 42 hours at the beginning of the project. Important improvements were made in the upstream part of the supply chain by starting a main-supplier program that reduced the total number of suppliers and by optimizing ordering and delivery schedules. In the old situation small volumes of fresh goods (less than 1,000 kg per delivery) were brought in by a large number of suppliers (more than 100). This resulted in high handling costs and required costly quality control. Within one year after the start of the project the number of suppliers was reduced to less than 50 and these had increased volumes per delivery.

4. **HACCP program:** Food safety issues are high on the agenda of all stakeholders in the Thai supply chain for fresh products. The training program was established for HACCP – a widely recognized cost effective approach to establishing food-safe production, sanitation, and manufacturing practices.

**Strengthening the knowledge infrastructure**

Two additional components were added with the intention of strengthening the knowledge infrastructure of both the Netherlands’ and Thai institutes involved:

1. A toolkit to develop a generic blueprint for agri-supply chain formation that is adjustable to various country specific parameters
2. A knowledge transfer and training program on agri-supply chain management that consists of a six-week module that fits within the existing MBA-program of Kasetsart University.

**Initial results and experiences:**

In the past two years a number of improvements have been achieved in the Thai perishables supply chain:

- A pilot has been started to train farmers in good agricultural practices and to provide them with improved technical inputs like seeds, etc. This assistance included a technical and economic monitoring system for ongoing input-output analysis.
- Lead times of main suppliers could be reduced considerably
- A pool for crates has been installed for 32 suppliers contributing to reduced losses and lower handling costs (that in the meantime has been accepted as a general standard by other (international) retailers in Thailand as well.
- By building a state of the art value-added distribution center in Bangkok, effective quality control could be realized at this stage along with more efficient deliveries to the shops.

Building internal knowledge within the chain

In the initial phase of the project local managers and employees were trained in their own field of expertise. People from quality control were trained in HACCP principles. Others from logistics and the buying department got additional training both locally and by sending them to one of the daughter companies of AHOLD, Albert Heijn, in the Netherlands, where they were trained to work in state-of- the-art distribution centers, focussing on topics like cross-docking, electronic ordering systems, etc. Vegetable and fruit growers were trained by seed and crop protection companies in order to be able to benefit fully from improved and hybrid vegetable varieties and a sustainable use of agro-chemicals.

In the second phase of the project, there will be a tailor-made supply chain management course, organized in Bangkok by Kasetsart University, Wageningen School of Management, and representatives from the agri-business community in Thailand (including Ahold, Rabobank International, Novartis, Unilever, Johnson & Johnson, Freisland Dairy International, Nestle, and others). This training will focus on young potential middle managers and relevant policy makers from the Department of Agriculture, the Bangkok Metropolitan Authorities, and the Food and Drug Administration.

Realigning competitive relationships

The supermarket group and its subsidiary, the World Fresh distribution center, took the role of chain leader. Part of the supply chain developments were initiated top-down (for example the preferred supplier program that included the reduction of the total number of fresh goods suppliers from over 100 in 1998 to less than 50 in 2000). Other developments occurred spontaneously bottom-up; a number of the preferred suppliers voluntarily got their products certified on basis of WHO safety standards and good agricultural practices and selected a number of growers to implement this certification program.

The role of the government

The Netherlands' and Thai government initiated the partnership not only to create a platform for the pilot project but also to lay a foundation for future co-operation in the field of agri-supply chain development. The Netherlands’ government participates in ACC, which sponsored 40% of the project. The Thai government participated through the Ministry of Agriculture. Its Department of Agriculture is responsible for the certification program for fruit and vegetables. The Department of Livestock has a similar certification task for the meat products. The Bangkok Metropolitan Authorities participates as a stakeholder in the certification program in discussing and setting acceptable standards.

Options for small-holders and small suppliers

Individual smallholders have difficulties in meeting the product specifications and supply conditions of large commercial retailers. Nevertheless, they can be an interesting supplier once they are able to improve their products and get organized as a group. In order to explore and develop this opportunity the supply chain project has contacted two initiatives: the FAO IPM program for Vegetables in Southeast Asia (including Thailand) and the DANCED project for the development of sustainable agriculture. Both projects focus on
IPM techniques and good agricultural practices and both of them try to stimulate bottom up approaches in stimulating farmer-organizations. Horizontal co-operation between growers will be an option to grow from arm's-length trading into co-makerships and long-term relations.

Funding

The funding was based on the following: 40% of the project budget came from the participating private companies, 40% came from the ACC program in which the Netherlands government participates and the remaining 20% came from the participating Netherlands knowledge centers and research institutes.

V. Additional information and resources

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Readings

**Internet links**
- www.kc-acc.org
- www.unido.org
- www.unctad.org
- www.intracen.org
- www.ilo.org
- www.usp.br
- www.lei.wageningen-ur.nl

(to be completed)
Annex 1

4 Steps for Setting Up Agri Supply Chain Projects

Phase 1  Orientation or analysis phase

The first step in a typical supply chain development project consists of an analysis of the problems in the chain, the identification of the players and the ambitions of these players. It should be based upon a bottom-up approach: initiatives from companies form the basis for setting up agri supply chains.

Questions that should be answered in this phase are:
- Who are the players in the supply chain, what are their roles, competencies and relationships?
- Who will be the selected project partners?
- What kind of strategic alliances and organizational design would be desirable (with both public and private agents)?
- What would be the socio-economic impact of the supply chain project?
- What are the stakeholder perceptions in terms of definitions and ambitions?
- What is the existing technology and what are the organizational drivers and needs?
- What is the service level of the existing supply system?
- What are the lead times for the selected goods?
- What is the cost and value added structure of the supply chain?
- Is there any information on the direct product (or category) profitability?
- What are the quality categories and what are the existing quality monitoring systems?
- What are the customer preferences and how to achieve customer satisfaction?

With the use of a SWOT analysis it will be possible to define the strengths and weaknesses of your chain partners, and identify the opportunities and threats of the supply chain environment. In order to prioritize the kind of supply chain that you want to develop first it is helpful to apply a portfolio approach for classifying products according to their commercial importance. For example Kraljic's product portfolio (1983) classifies products according to two main criteria: the financial risk of a product (its impact upon the turnover, profit and safety risk) and the supply risk of a product (number of potential suppliers, location of suppliers, shelf life, and scarcity situations or seasonally).

For analytical purposes the products are subsequently divided into four categories: routine products, leverage products, bottleneck products, and strategic products. The purchasing strategy for each category differs. The strategic goods with a high supply risk and a high financial risk typically demand the development of partnerships

⇒ Result of Phase 1: the identification of major challenges and building stones for strategy formulation

Phase 2  Definition phase

In the second phase of the project the insights gained in the orientation phase have to be translated into strategies and an action plan. A logical framework approach can be used to set goals, objectives, methodology, inputs and outputs:
- What is the overall goal of the project?
- What are the specific detailed objectives of the supply chain project?
- What are the required inputs and activities to achieve the objectives?
- What are the expected outputs for each of the planned activities?
- What are the specific risks for each of the objectives and activities?
- How will these risks be handled?
- What will be the time schedule and planning for the project?
- What will be the management structure of the supply chain development project?
- What kind of budgets and financial arrangements are required?
- What accompanying material investments are needed?
- What kind of knowledge is needed within the supply chain and where can it be found?
- What will be the contribution from each participant and what is the motivation for this contribution?

Since agri supply chain projects take place in various countries and cultural settings it is necessary to determine local indicators that influence the selection and use of analytical tools.

⇒ **Result of Phase 2:** A detailed project plan for improving agri supply chains

**Phase 3 Implementation phase**

Execution of your working plan: after mutual agreement upon the plan by all the stakeholders the execution should take place in time and according schedule. To facilitate this, a proper project organization should be set up for support during the execution phase.

A steering group should be organized consisting of important representatives from the chain links, branch and public organizations, and the financing parties. The steering group has an independent chairman to ensure that it can function effectively.

The day to day project management should be supported by a coordinator since agri supply chain development projects generally consist of various components (in the fields of logistics, technology (ICT), total quality management, etc.) that need to be coordinated and linked to each other. The coordinator preferably is selected from one of the participating universities or research institutes since these often play an intermediary role between the public and private stakeholders. The coordinator should have research experience in international projects. He or she should be familiar with chain science and related disciplines and preferably have a network in the international chain science knowledge infrastructure. He or she should have extensive experience with complex project management and good negotiating skills.

Feed back on interim results; eventually leading to adjustments in project. Practical experiences have shown that supply chain development is very much a process approach.

Special attention is needed for knowledge transfer and training: the concept of agri supply chain development is fairly new (especially for emerging markets). Within the supply chain partners have to become acquainted with new concepts like chain marketing, logistics, quality control, certification, tracking and tracing, etc. In order to guarantee the sustainability of the supply chain development it is advisable to invest in local knowledge about supply chains in close co-
operation with universities and research institutes (for example by adding a special agri-supply chain module to existing MBA programs).

Supplier relationships can be strengthened by enhancing their communication, providing the supplier with more traded volume, or involving the supplier in product development or value analysis. To give the supplier more volume is one way of strengthening the relationship without allocating considerable new resources to the relationship. Before changing suppliers it is important to reconsider the supplier's influence on the network position. The supplier could be important in relation to other members of the network. Development of a supplier is a long-term focus.

**Result:** Functional agri supply chains

**Phase 4 Evaluation and monitoring phase**

In this phase the implemented adaptations are finished and have to be evaluated. It involves the testing of the results of the project and the readjusting of phase 1 so that new challenges can be faced. An evaluation can be of a qualitative and quantitative nature. Economic returns on investment can be calculated from a business economic point of view but also attention has to be paid to aspects like knowledge development, and co-operation developments between supply chain partners. The process of planning involves attention of two kinds of issues: conceptual issues and technical issues (Patton, 1987). Conceptual issues focus on how the people involved think about the evaluation and include the following questions:
- Who are the primary stakeholders for the evaluation?
- What is the purpose of the evaluation?
- What approach, model, or framework will be used to provide direction for the evaluation?
- What are the primary evaluation questions or issues?
- What political considerations should be taken into account?
- By what standards and criteria will the evaluation be judged?
- What resources are available for the evaluation?

The technical design grows out of and is matched to the conceptual direction of the evaluation. The technical design is a plan for data collection and analysis. The technical design answers the following questions:
- What will be the method(s) of inquiry (e.g. interviews, workshops, case studies)?
- What will be the primary unit of analysis?
- What will be the sampling strategy?
- What comparisons, if any, will be made?
- What kinds of data will be collected? From whom? When? Using what instruments?
- How will the quality and accuracy of the data be ensured? What level and type of accuracy is needed?
- How will concerns about validity and reliability be addressed?
- What kind(s) of analysis will be conducted?
- What kind(s) of statements and findings will result from the analysis?

Since agri supply chains function within dynamic environments and ought to be responsive to new challenges agri supply chain development should be considered as an ongoing cyclical process. The evaluation should raise new questions and actions. The evaluation phase should cover questions like:
- Have the set objectives and targets been reached?
- Have the results been achieved in time?
- Have the activities been carried out within the proposed budget constraints?
- If not, what was the reason for the deviation?
- Will the supply chain strategy be the same in the next 5 to 10 years?
- What kind of new challenges and problems do we face?
- What type of supplier relationships could be attractive in the next 5 years?
- What new challenges do we face?

Ongoing monitoring also includes quantitative aspects and qualitative aspects. Quarterly financial reports can illustrate the economic progress of the program. Questionnaires to be answered by the various stakeholders (project leader, research institutes, companies), can shed a light on matters like:
- positive experiences in the project
- reasons/factors that affected the project
- grading of stakeholders performance on aspects like: vision on project goal, commitment to the project, openness to other project participants
- most important lessons learned
- commitment to future participation.

⇒ Result: Strategic co-operation in agri supply chains