



*International Food and Agribusiness Management Review*  
*Volume 10, Issue 4, 2007*

## **Innovation and Governance in International Food Supply Chains The Cases of Ghanaian Pineapples and South African Grapes<sup>1</sup>**

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### **Abstract**

This paper reports an exploratory case study on innovation in, and governance of, international supply chains originating in developing countries. Two African fruit export chains are analyzed: the table grape chain from South Africa (a highly developed chain) and the pineapple chain from Ghana (a newly emerging chain). The most important market for both chains is the EU. The two cases present complementary perspectives on international supply chain development. The paper shows that Western demands in these cases lead to innovation at the producer end of the international supply chain and changes in governance structures towards chain coordination and vertical integration.

**Keywords:** international supply chains, innovation, governance, developing countries.

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1 We thank KLICT (Chain networks, Clusters & ICT) for their research grant, which made this study possible. Furthermore, we thank Dr. James M. Hagen of Cornell University, USA, and Dr. Vincent Amanor Boadu of Kansas State University, USA, for their input during the research project and Prof. S.W.F. (Onno) Omta of the Business Administration Department of Wageningen University, The Netherlands, for his comments on earlier versions of the paper.

## **Introduction**

Developing countries are becoming more and more part of global food chains due to an increase of the demand for exotic products supplied year round to in particular Western consumers. Concerns of Western consumers regarding food safety, environmental issues and social aspects such as wages, working conditions, etc., bring about new demands for producers in developing countries. Consequently, to be able to compete on the world market, producers and traders in developing countries must adapt to stringent quality and safety standards and regulations in these Western markets.

Since the 1990s, Western retailers have increased their demands on suppliers of fresh produce. In 1998, UK retailers cooperating in the British Retail Consortium (BRC) took the initiative to formulate common food safety and quality standards for suppliers of food. The BRC standard and other private 'codes of practice' and standards, like Eurep-Gap (a primary producers standards supported by major retailers) are now applied by supermarkets and importers all over the world to coordinate supply chain activities and control food safety. The introduction of these standards implies that producers and processors have to implement registration systems to record issues such as the use of crop protection agents and fertilizers, production and processing methods and labour conditions (Marsden, 2000).

A range of new technologies has been developed over the past decade to increase the use of ICT and improve logistics and quality management in supply chains. Cross-border supply chains can be seen as vehicles through which new forms of production, (on-farm) technologies, logistics, new managerial procedures and organizational networks are introduced. In this way, technological standards and systems to guide and control processes and flows of goods and information (such as HACCP, tracking and tracing) are becoming increasingly internationalized.

The objective of this paper is to explore how international food chain development contributes to innovation and new governance structures in chains in developing countries: do demands in Western countries induce innovations 'upstream' in food supply chains in developing countries? By innovation, we mean technological and system (e.g. quality) innovations as well as innovations in governance structures. To investigate this question, exploratory research was performed in two fresh fruit export chains from developing countries to developed countries: the pineapple export chain from Ghana and the table grape export chain from South Africa. Both supply chains are characterized by the involvement of a large number of producers who are facing increasing international market demands which have to be fulfilled in order to participate at the global market.

## Research Approach

During the past decade there has been extensive theory building in the field of food supply chains (Lazzarini et al., 2001; Gereffi, et al., 1994; Friedland, 1994). The perspective taken in this article is twofold:

The first perspective in this article explores how technology and system innovation takes place in the two cases. Theoretically, we lean on the Supply Chain Management Approach aiming at “Chain Reversal” (Folkerts-Koehorst 1997; Thorpe-Bennet, 2004) in which market demand becomes leading in structure and operations of the supply chain and which focuses on renewal and integration of business systems to improve supply chain planning and balance supply and demand across the supply chain (Bowersox and Closs, 1996; Cooper et al., 1997; Lambert and Cooper, 2000; Stern et al., 1996). This approach includes major attention to innovative information and communication technology that is the backbone of these integrated chains (Lancioni et al., 2000; Porter, 2001). Furthermore, it focuses on integrated quality management and tracing systems that are considered a pre-condition for modern supply chain management (Van der Spiegel, 2004; Humphreys et al., 2004). In this light an important field for study is the (in-)possibility of many developing country farmers to comply with quality standards of Western markets (Vellema and Boselie, 2003; Giovannucci & Reardon, 2001).

- The second perspective concerns the choice of governance structure in these international chains. The choice of governance mechanism is largely dependent on the costs of transactions, investments in business transactions, information asymmetries between parties, and social and cultural elements such as family relationships and village social structures. (David and Han, 2004; Grover and Malhotra, 2003; Ruben et al., 2007). In general we recognize three types of governance structure: spot market (“arms-length”), hybrid (e.g. contract) and vertical (organizational) integration (Williamson, 1985, 1999). Developing countries have a number of specific features impacting on the choice of governance structure:
- developing country business relationships in particular are subject to many uncertainties caused by: poor physical infrastructures (storage/cooling facilities, roads, telecommunication, etc.), weak institutional infrastructures (government support, sanction systems, etc.), unbalanced trade relationships (dependencies, opportunistic buyer behaviour) and unfavourable social and political conditions;
- information exchange between companies is in many cases hampered by large information asymmetries between chain partners, lacking communication infrastructures, and diffuse market channel structures. This makes ex-ante monitoring of transactions difficult.

- uncertainties as mentioned above easily force companies at different stages in the chain to opportunistic behaviour so as to be able to sell their products. (Although, in general, the major incentive for companies to behave opportunistic is profit maximisation).
- transactions may be supported by investments (e.g. in packaging materials, cooling installations, transportation means, etc.). Such investments can strengthen mutual relationships. On the other hand, they require more integrated governance mechanisms to safeguard against opportunistic behaviour. Other important incentives for transaction-related investments in developing countries are the poor (physical) infrastructures that make investments to support business relationships necessary in many cases. (David and Han, 2004; Grover and Malhotra, 2003).

The general question of this research is: do Western market demands induce innovations and new governance structures ‘upstream’ in international food supply chains? This research question is, in line with our theoretical approach, composed of two sub-questions:

*Does market demand induce technological and system innovations ‘upstream’ in international food supply chains?*

*Which governance arrangements are used and how are governance structures and innovation related in these chains?*

The methodology used is the case study. The objective of case study research is to enhance understanding and to gain insight, and it is often explanatory, exploratory or descriptive. It is a preferred strategy when ‘how’ and ‘why’ questions are being posed (Yin, 1994). The case studies presented in this paper were performed by interviewing key stakeholders in and around the pineapple export chain in Ghana and the table grape export chain in South Africa in 2003. Both supply chains are export oriented. Producers are targeting different international markets (mainly in Europe) as these markets offer greater opportunities than the local markets. Though, second grade products are marketed at the numerous local markets. The two cases were chosen because they present different stages of chain development the modern advanced South African chain, with its advanced production and distribution technologies and well-developed market relationships, and the emerging but still weakly developed Ghanaian chain, with its low level of technology use and poor developed market relationships. They both originate from developing countries and data on these chains were readily accessible through the authors’ involvement in public-private research projects in the fruit sectors in both countries.

In Ghana, selection of respondents took place in collaboration with the University of Accra and the Royal Ahold (retail) office in Ghana. Furthermore, a Wageningen

University student conducted exploratory research in the pineapple sector in Ghana in the first half of 2003. In South Africa, selection of respondents took place in collaboration with CSIR Stellenbosch (a major South African research organization) and was based on an earlier (2003) research project in the South African table grape sector, in which a Wageningen University student also participated. In both Ghana and South Africa 20 key public and private organizations operating in the export pineapple business and the table grape export business were selected for face-to-face interviews. The same questionnaire was used in both countries. It included questions on changing market demands (quality, price, etc.), evolution of technology and systems (use of pesticides, fertilizers, quality systems, equipment used and investments) and buyer-supplier relationships, horizontal collaboration and credit structures. Face-to-face interviews were held in each country in late September/early October 2003. During the interviews, questionnaires were filled in and explanations and additional information were recorded and later transcribed in interview reports. In some cases where additional information was required, respondents were approached by telephone with additional questions Table 1 provides an overview of the types of organizations represented by the respondents from the two chains.

**Table 1:** Types of organizations represented by respondents (1 respondent per organization)

Type of organization	Ghana	South Africa
Chain company (*)	5	5
Service provider (quality, logistics, information systems)	4	5
Bank (commercial and development banks)	3	3
Government (ministries, control and promotion boards)	3	2
Research/academia	1	5
NGO	4	
Total	20	20

(\*) "Chain companies" in Ghana consisted of 1 large producer, 1 large cooperative, 1 producer organization, 1 exporter and 1 international retailer. In South Africa "chain companies" interviewed were 3 farmers (two also representing farmers organizations) and 2 exporters. All "chain-companies" included were export oriented. Although both case-sectors were in general export-oriented, other respondents were asked to reflect on domestic oriented supplies as well. In Ghana, NGOs play an important role in the development of the pineapple sector; four of these organizations were therefore included in the research. In the South African grape sector, NGOs do not play a role of any significance. However, research organizations and universities play a stronger role in this sector. For this reason 5 representatives from these organizations in South Africa took part in the research.

## **Background Information on Cases<sup>1</sup>**

### **Ghanaian Pineapple Chain**

The production of vegetables and tropical fruit for export in Ghana is expanding. With traditional crops such as cocoa, yam and maize coming under increasing pressure due to low world market prices, pineapple is now a crop of great importance to Ghana. Producers have become to realize that the production of pineapples for the export market is a very profitable business and generates a fast return of currency (12 to 15 month's production cycle). Besides that, the pineapple is a relative easy product to cultivate. Pineapples rank first as Ghana's most important non-traditional horticultural export product, contributing around 24% of total horticultural exports (GEPC, 2002). Pineapple exports from Ghana increased from 15,319 tons in 1994 to 46,391 tons in 2002 with a temporary decrease in 1998-1999, due to drought. Most pineapple is exported to the EU, with Germany as the most important importing country (30% of total exports) (Source: GEPC, 2003).

The value of Ghanaian pineapple exports was US\$13,316,459 in 2001 and US\$15,519,989 in 2002. Almost 50% of the total export volume was exported by four large companies: Jei River Farm (8403 tons), Farmapine (6255 tons), Koranco Farms (4147 tons) and Prudent Farms (3420 tons) (GEPC, 2003). The total export value of all agricultural products from Ghana in 2002 was US\$85,730,637, which shows the importance of pineapple for Ghana (GEPC, 2003). A further (major) increase in the production of pineapple was expected for 2003.

It is difficult to provide the exact number of producers cultivating pineapples in Ghana. The main reason for this is that a large number of producers are located in remote areas and sell their harvest to local middlemen who handle the products from the farm-gate onwards. These producers are invisible for the pineapple export organizations (like cooperatives) and are therefore not included in statistics. Furthermore, a number of small-scale producers cultivate pineapples on an irregular basis. Especially after a year in which the European market prices are high, producers tend to start cultivating pineapples in the hope to benefit from these high prices the following year. Because of this, the number of producers differs each year. It has been noted by the sector that the number of small-scale producers has increased since 1995 as a result of the good market prices in Europe.

Infrastructures in Ghana are weakly developed: the transportation infrastructure is weak, a cold chain is non-existent and transportation overseas is irregular and expensive. Nevertheless, the number of pineapple farmers has increased considerably in the last years. In particular because of the recognition of international market opportunities by the local producers.

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<sup>1</sup> Data from the period of field research, until 2004

The pineapple production system in Ghana can be classified into the following groups:

### *Producers*

- *Specialized plantations with out-growers*  
These large (>500 ha) farms specialize in pineapple production. Farms are often run by farmer-exporters who have integrated production and the export trade. In general, specialized plantations have a vertically integrated business from the farm to the port. They have direct contact with their customers in Europe, their own trucks and their own shaded pack houses, thus controlling all the activities necessary for exporting. To meet export market demands, the large farms buy about 45% of the exported pineapple fruit from small farmers (Sarpong, 2002). Large-scale farmers provide input material, inspection and training to out-growers. Furthermore, they may apply fertilizers and chemicals to the plants of the out-growers and in some cases take care of harvesting. Almost 75% of the total pineapple export volume is exported by these specialized plantations.
- *Medium-scale (diversified) export farms*  
These farms often grow a diversified portfolio of crops (mangoes, papayas, pineapples, vegetables). They export these products themselves to the European market or sell them to the local processing industry which exports the processed products. Farms with less than 500 hectares or less than 90% pineapples are categorized as medium-scale (diversified) export farms.
- *Organized smallholders*  
In 1998 the structure of the Ghanaian pineapple business changed. With the support of the World Bank, 178 farmers and two pineapple exporters (namely Gabrho Limited and Kokobin Farms) formed a cooperative called Farmapine. The World Bank granted a loan facility to Farmapine, which was partly used to purchase and supply inputs to farmers. Through cooperation in purchasing inputs, the farmers now enjoy lower prices, and through cooperation in exporting they are no longer dependent on other exporters. Farmapine has built a central packing facility for all pineapple exports. Currently, Farmapine has over 200 members, all of whom own between 0.5 and 10-15 hectares.
- *Non-organized smallholders*  
These farmers produce normally for the local market, and occasionally for larger farmers when there is sufficient demand. Ghana has hundreds of small pineapple farmers who cultivate up to 4 hectares of land. They have limited access to mechanical equipment and rely on market availability. They buy their own inputs and sell to any willing local middleman. However, if they supply on a more regular basis to a larger farmer, we call them out-growers. Out-growers are often supplied with seeds and in return promise to sell their

crops to the exporter. Sometimes they also receive other inputs or cash in advance but in general there is no written contract, only an oral agreement. The estimated number of non-organized pineapple producing smallholders is 1000.

### *Middleman*

A number of middlemen collect pineapples from, in particular, small-scale farmers for the export to Europe. These middlemen pay the farmers a farm-gate price and handle the products from the farm-gate onwards.

### *Transportation*

We can distinguish two means of transport from farm to port; privately owned trucks and contracted trucks. The contracted trucks are mainly operated by one-man businesses that accept almost any type of load. The trucks are often in poor condition and they don't have a cooling facility. Privately owned trucks are mainly used by export firms and by organized smallholders. Most of these trucks are in good condition and some have a cooling facility (Pegge, 2003). Around 95% of the total pineapple export is transported by boat. Due to the relatively small scale of the Ghanaian exporters, they are often forced to accept the residual space available on ships and airplanes, resulting in delays and extra costs. In this regard, respondents reported a strong increase in transportation costs in the last five years. Lack of cooperation among exporters and inadequate long-range planning exacerbates the problem of managing available sea/air freight space (Pegge, 2003).

### *Trading and export*

There are no longer many traders in Ghana who trade only fruits. Most traders acquired pineapple farms during the past few years to ensure regular and sufficient supply. The number of exporters has fluctuated between 50 and 70 during the last decade, although just 10 companies accounted for 80% of all exports. These 10 larger exporters are the specialized plantations with out-growers and the cooperative Farmapine. The other exporters in 2002 can be classified as medium-scale (diversified) export farms. 16 large producers are members of SPEG (Seafreight Pineapple Exporters association Ghana). Figure 1 depicts the structure of the Ghanaian pineapple export chain.

## **South African Table Grape Chain**

The South African fruit industry has seen some dramatic changes over the past ten years, moving from a fully regulated market environment towards a free market system (McDonald and Punt, 2001). At the same time Global fruit demand has increased considerably offering new opportunities for fruit exports from developing



### The pineapple export chain

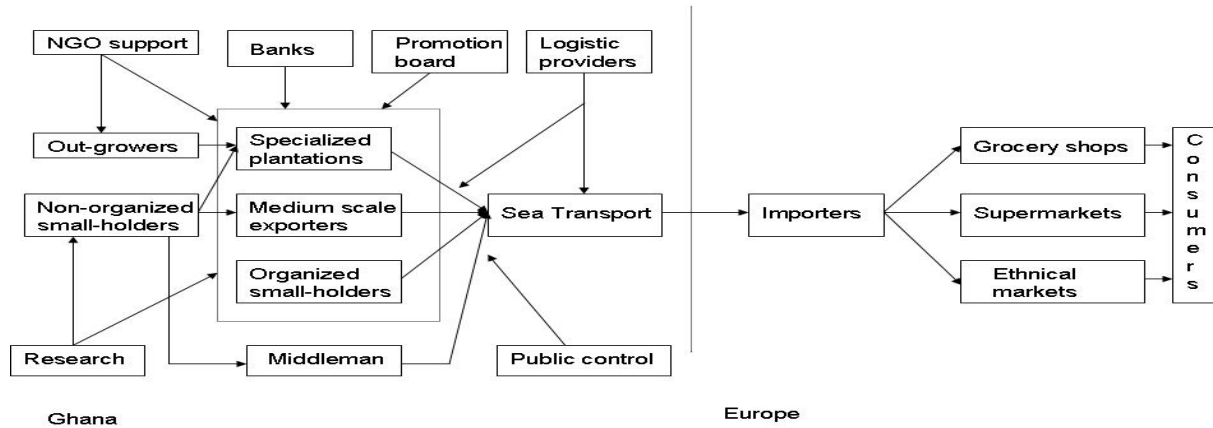


Figure 1: Ghana pineapple export chain

countries. Prior to deregulation in South Africa in 1997, there was one single marketing channel for most of the commodities. This meant that the supply chain was relatively simple and it was relatively easy to manage and optimize the chain, as well as to balance supply and demand (Vos, 2003). The fresh fruit and wine industries have gained the most from the opening up of export opportunities. Between 1995 and 1998 exports of deciduous fruit increased by 32.7 %, from 400,800 to 531,800 tons (PPECB, 1999). Also, the export of table grapes increased from 109,907 tons in 1996/1997 to 190,536 tons in 2001/2002 (DFPT, 2002). Approximately 84% of table grape export is exported to the EU (of which 22% to the UK) (DFPT, 2002).

Currently the South African table grape sector is under high competitive pressure. Market forces threatening SA table grape production mentioned by respondents are oversupply of fruit world wide, the strong currency (Rand), and new competitors (Argentina, Brazil, Peru).

The South African table grape chain can be described as follows.

#### *Producers*

In 2003 there were 974 table grape producers in South Africa. Farms are in most cases modern-enterprises that use high-quality input materials and production methods. During the period of Apartheid most workers lived on the farm estates throughout the year. Since the end of Apartheid, labor mobility has increased enormously because of more stringent labor legislation and higher wages (South African Labor and Minimum Wages Act of 1997). According to one respondent (October 2003), 66% of all fruit companies (not only grapes) reduced their labor

forces in the last two years and will keep reducing in the next years. However, even in places where laborers do not live on the farms anymore, the largest part of the population is still dependent on the fruit sector. In recent years, the number of producers has slightly decreased and more efficient production in larger units has developed.

### *Cold stores*

After the harvest, grapes are first stored in cold stores that belong to an individual farmer or are cooperatively owned (e.g. EXSA, approx. 40 producers that export together). Every grape-producing region has a number of cold stores; for example, in 2003 the Orange River region had 40 cold stores, the Hex River region 12, the Berg River region 10 and the Northern region 14. Before deregulation (1997) cold stores were more concentrated. In the near future a further increase of the number of cooling/storage facilities is expected, especially for the Durban region.

### *Transporter companies*

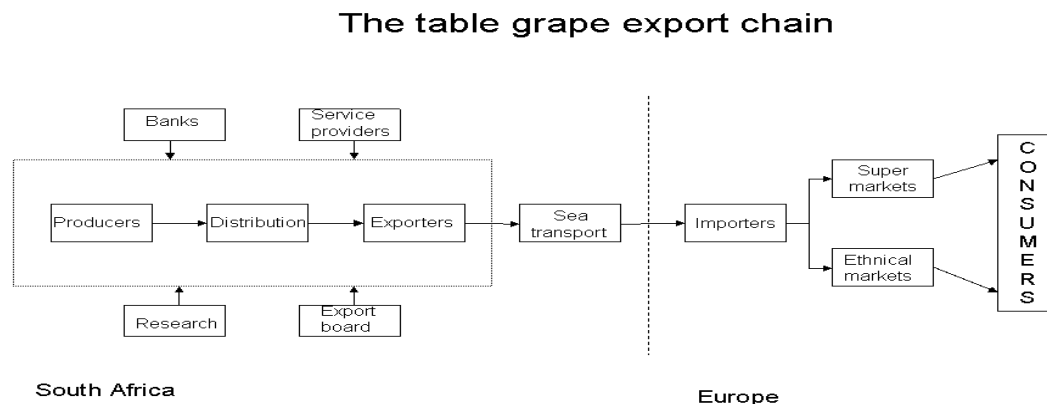
South Africa's transport infrastructure (air, road, rail and sea) is well developed. The road, rail and air transport services are good throughout most parts of the country. The quality of infrastructure in the rural areas varies. Most grapes are destined for export, although some grapes of lesser quality are sold at South African supermarkets or at street markets. Grapes for export are transported to the harbor (Cape Town and Durbin are important harbors) by modern transportation companies with cooled trucks.

### *Exporters*

Since the industry in South Africa was deregulated and the overseas market for fresh fruit opened up for South African producers, the number of exporters has increased enormously to more than 386 registered in 2003 (FPEF, 2003). The most important export organization is FPEF (Fresh Produce Exporters Forum) with 70 members who are responsible for 85% of the export volume.

### *Markets*

Respondents reported a static or even declining market share for Europe, because of increasing international competition, except for the UK because of the good long-term connections with UK retailers and specific demands of these retailers (e.g. for seedless grapes). Asia (especially Indonesia) might become a new market for South African grapes. Indeed, quality and safety demands in Asia are still much lower than in the EU. However, investment, e.g. in a cold chain, is difficult because of political instability in that part of the world. Other potential markets in Asia are India, China and Japan. Figure 2 depicts the South African table grape export chain.



**Figure 2:** South African table grape export chain

From figures 1 and 2 we see differences between the two chains. The South-African table grape chain has a less complex (more “straightforward”) structure than the Ghanaian pineapple chain, if we include the small-holders in this chain. There are no “middleman” in the South-African chain.

## Effects of Market Demands

### Technology and system innovations

All respondents in both countries reported a very strong increase of market demands on quality and safety of produce, consistency of quantity, on-time deliveries, traceability, selection of input materials and labour conditions (the average score on a 1-7 likert score of the Ghanaian respondents was between 6 and 7 and of South African respondents between 5.5 and 6). An explanation for the difference in score between Ghana and South-Africa is the higher level of development of the grape sector in South-Africa and the fact that SA grapes already satisfy many demands. Consequently, the grape sector faces fewer requirements to develop the sector according to the increasing demands of the retailers/exporters.

According to the interviewees, farmers are changing their production methods to comply with the changing market demands. A major increase in demand is related to the restricted use of pesticides and fertilizers (Eurep-Gap principles). Both South African and Ghanaian respondents reported a decrease in the use of pesticides over the last five years because of market requirements. In South Africa a decrease in the use of (chemical) fertilizers was also reported. In this respect various respondents stressed an autonomous development toward safer production both

related to cost considerations (chemicals are expensive) and awareness of new, safer, production methods. Further, in both sectors more attention is now being paid to (Eurep-Gap complying) quality systems, cooling facilities (although in Ghana this is restricted to a few cooled trucks), bar-coding, farm equipment (tractors) and harvesting and packaging facilities (sheds). In line with these findings, increases in investment in Ghana were found in land equipment (tractors to prepare the land, plastics to protect produce from bugs and investments in new pineapple varieties), packaging sheds, bar-coding (by a few large producers) and (to a lesser extent) in cooling. South African producers have focused their investments on packaging facilities, cooling facilities (smaller units) and bar-coding, hereby complying with international standards. Respondents in South Africa underlined the importance of manual labour in dealing with the delicate table grapes. In Ghana we see these changes especially amongst the large producers, whilst in South Africa all types of producers are involved.

At the chain level in South Africa we see innovations in packaging and packaging standards (pallets, food safety related issues, carton sizes), IT standards (e.g. traceability), quality standards in general and cooling technology development. A constraint with regard to the development of new packaging materials is that the costs of these innovations cannot be easily included in the product price, because of strong price competition in consumer markets. There is no innovation 'owner' in the South African table grape chain (contrary to the situation before deregulation where Capespan [the exporter] was involved in packaging innovation). In Ghana, except for Eurep-Gap induced innovations, no innovations at the chain level have been introduced so far. Figure 3 gives an overview of innovations in both chains, based on the interviews with different chain stakeholders.

A direct effect of international retail demands on local production systems can be identified in the South African table grape chain. Quality and safety are currently receiving high priority in South Africa, with the export sector taking a leading role in these developments. Compared to the Ghanaian pineapple chain, the investments and innovations in the South African table grape sector are far more advanced, including modern cooling systems, coding technology, etc. An important innovative role in South Africa is played by the exporters, who invest in chain-wide information systems and also perform educational activities for parties throughout the chain.

South Africa had a relatively modern and adequate ICT infrastructure before deregulation in the mid-90s, when there was (in a logistics sense) only one export marketing channel for grapes. Since the deregulation, however, ICT systems have become fragmented. Several organizations (such as PPECB, the export control board, and software companies) are currently involved in the development of standards and interfaces for existing "legacy" systems, in order to support development of supply chain management systems in these chains.

	South African table grapes	Ghanaian pineapple
Exporters	In recent years SA exporters have been investing in chain information systems (from cold stores to harbor facilities) for logistics planning and traceability purposes.	In Ghana basic packing and storing facilities have been constructed in the harbor by various exporters. There is no supply chain system innovation.
Transporters	Modern reefer transportation with advanced cooling technology. Good transportation infrastructure enables frequent and fast transportation. The use of cell-phones in the last decade has greatly improved transportation and logistics planning.	Transportation infrastructure is still weak with old transportation facilities (except for a few modern trucks owned by large producers).
Cold stores	Development towards smaller, sophisticated, cooling units. Development of EDI communication with exporters.	No cold chain present in fruit sector in Ghana.
Producers	Emerging pre-cooling technology, high level of Eurep-Gap certification in SA table grape sector.	<u>Large farmers</u> : first Eurep-Gap consultants were active in 2003; Tractors have been acquired and modern pack houses have just been established.  <u>Small farmers</u> : hardly any incentives although out-growers are increasingly pressed to comply with quality demands.

**Figure 3:** Technology and system innovations in different chain links

Source: interviews

In Ghana development of an export-oriented pineapple sector has just started. MD2 (a new pineapple variety popular on the international market) and Eurep-Gap seem to have ‘woken people up’ (as one respondent stated) and are the driving forces for change. Developments are dominated by a limited number of large producers that are responsible for most of the, still limited, investments in this sector. Large farmers will all be certified in the near future.

An interesting side effect of Eurep-Gap implementation was reported by some large-scale producers. Because of Eurep-Gap, managers have a better overview of the cultivation activities in the field, since these are registered according to Eurep-Gap rules. In this way the new quality systems may support streamlining of the chain. Some of these developments will spread to out-growers. Since out-growers deliver an important part of Ghanaian pineapple production through large producers to the export market, they too will have to comply with chain demands.

Figure 4 depicts governance relationships between different links in both chains.

	South African table grapes	Ghanaian pineapple
EU market parties	<ul style="list-style-type: none"> <li>- Mixed contract and spot-market relationships, related to type of market partner (supermarket or importer)</li> <li>- Some large buyers (e.g. some UK retailers) provide credit to exporters</li> </ul>	Mixed contract and spot-market relationships (large contracts with German importers)
Exporters	<ul style="list-style-type: none"> <li>- Aim at long-term relationships with producers</li> <li>- Provide credits to producers</li> <li>- Investments in cold stores</li> <li>- Slowly increasing collaboration between exporters (through FPEF), e.g. in PR and marketing</li> </ul>	<ul style="list-style-type: none"> <li>- Integration with large producers</li> <li>- Provide credit to large producers</li> <li>- No collaboration between exporters</li> </ul>
Transporters	<ul style="list-style-type: none"> <li>- Only short-term contracts between exporters and transportation companies exist</li> <li>- There is a development towards chain solutions, i.e. transportation companies taking care of transportation between different links in the chain</li> </ul>	<ul style="list-style-type: none"> <li>- Integration with large exporters</li> </ul>
Cold stores	<ul style="list-style-type: none"> <li>- Cooperative ownership alongside private ownership of cold stores</li> </ul>	
Producers	<ul style="list-style-type: none"> <li>- Opportunistic sales behaviour leading to weak forecasting and logistic planning in the chain</li> <li>- Cooperative investments in cold stores</li> <li>- Moderate collaboration increase in marketing</li> <li>- Development of producer-exporters</li> </ul>	<p><u>Large producers:</u></p> <ul style="list-style-type: none"> <li>- integrated with exporters</li> <li>- aim at long-term relationships with out-growers</li> </ul> <p><u>Small producers:</u></p> <ul style="list-style-type: none"> <li>- want to integrate in export chain</li> <li>- are dependent on large producers (for market access, inputs, credits)</li> </ul>

**Figure 4:** Governance relationships between different links in the Ghanaian pineapple chain and the South African table grape chain (source: interviews)

## Effects on Governance Structure

Chain integration has been emerging in South Africa for some time now. Increasing demands of Western retailers and (slowly) growing long-term relationships between parties (retailers, exporters – and to a lesser extent producers) are structuring the chain towards hybrid, contract based, governance structures. This form of governance is strongly supported by the exporter-link, where initiatives for information and quality system integration are taken to better attune processes in the chain. Moreover, direct relationships with Western retailers stimulate the

emergence of efficient (fast, responsive) and flexible chains. At the same time chains are being consolidated through reductions in the number of parties in different links, which also may lead to more balanced relationships and strengthening of the chains as a whole. Respondents also expect that more producers will become exporter-producers as a way to try to lower costs and exert control over the supply chain. These developments are enforced by transaction-related investments of exporters (such as investments in cold stores and credits to producers) to ensure deliveries (whereas in Ghana banks are reluctant to finance perishable produce). Transportation is another activity that is developing in line with these integrating developments: respondents expect that transport providers increasingly will become chain service providers, covering the chain from pack house to cold store and from cold store to ship or plane. However, a major barrier to the further development of these integrated chains is the opportunistic sales behaviour of producers, which is also a barrier to increased efficiency in the chain (information asymmetry leads to bad planning by exporters and transporters, according to most respondents).

In general the sector is considered to be conservative and individualistic, which is reflected by the opportunistic behaviour in the chain, in particular at producer level. However, with respect to technological innovation there are differences between the production regions (with a new production region like the Orange River area being more innovative, for example, in using small scale on-farm cooling facilities). Recently, marketing has been taking place at a more regional level, including efforts related to the branding of produce (SA table grapes, ORPA grapes, etc.) and the establishment of joint marketing forums between exporters and producers. Internationally, the entrance into new (Asian) markets reflects a (slowly) growing independence from European importers and retailers – i.e. the relative power of exporters in this chain is increasing. Their position is being strengthened further by the (slow) increase in collaboration at exporter level (e.g. joint marketing, joint access to new markets). To be competitive in the international market, however, exporters and producers will have to evolve more long-term relationships. In this sense, increased collaboration at producer level could strengthen their position in the chain, both nationally as well as internationally.

One large challenge for the South African table grape sector is the still large distinction and lack of trust between black and white employees on the farms. ‘Transformation’ of a black-white economy into an integrated economy is progressing (too) slowly. Greater effort and educational initiatives have to be undertaken.

In the emerging Ghanaian pineapple chain, market demands have led to a fragmented production system, with a few large integrated producer-exporters and many small producers (out-growers). Although many exporters seek long-term relationships with retailers to ensure demand, this is still constrained by weak market opportunities, a very weak infrastructure and the opportunistic behaviour of chain participants. Contrary to the South African table-grape chain there is no

(horizontal) collaboration between exporters. In Ghana many small-scale producers depend on large-scale producers for input supplies, market access and credits. Furthermore, transportation is increasingly organized by exporters. These dependency relationships between large producer/exporters and smallholders lead to chains in which smallholders are forced to find market access through large producers in an imbalanced buyer-supplier relationship. As far as reported, no written contracts exist between smallholders and their customers. Therefore, the existence of a large cooperative like Farmapine, with many smallholder members and out-growers, is promising. Development of niche market production, such as fair trade or organic production could be an opportunity for Ghanaian producers to ensure demand. On the other hand, the limited collaboration between exporters and the weak national and international infrastructure, limit further developments. Respondents reported a very moderate increase in collaboration between farmers, in purchasing and marketing. In general, respondents reported that the sector is not well organized.

With regard to the credit structure, in general, respondents reported that banks are not eager to finance perishable products because of the high risks involved. Small-scale producers need a guarantee from a large-scale producer or an importer to be able to receive credits from banks. Farmers receive credits more easy if they are members of Farmapine. Moreover, because of the high inflation rate, the interest rates for credits are between 29-32% (2003). Twelve out of 19 respondents reported that exporters are becoming more important for credit provision to farmers (particularly in the form of input material). Furthermore, ADB (African Development Bank) provides credits for land preparation (labour costs), inputs (chemicals, tractors) and harvesting (labour costs).

## **Conclusion and Outlook**

In this paper two chains have been explored to gain insight in innovation in international supply chains from developing countries and what governance structures emerge in these chains. Two supply chains with different stages of development were chosen. The South African table grape chain is a mature chain in which concentration and consolidation of parties is taking place. The Ghanaian pineapple chain is a newly emerging supply chain, with many constraints to overcome. Both export chains are constrained by external factors.

From the research reported we arrive at the following findings and hypothesis for further research:

## **Technology and Systems Innovation**

The analysis of the two chains shows that innovation follows international market demand. In Ghana we see business investments by large producer-exporters in quality control, tractors to improve production processes, transportation and pack



houses. In South Africa respondents reported business investments in cold stores (by producers and producer associations), transportation (transportation companies) and infrastructure in general. Especially in the field of quality and safety of produce we see that important changes have taken place in production systems and the use of technology in the past five years. Respondents in both chains reported a strong relationship between Western standards like Eurep-Gap and these developments. It is important to note that investments in both chains focused on infrastructure (e.g. trucks) and product-related improvements (e.g. more environment-friendly pesticides). Less attention has been paid, particularly at producer level, to management systems (information exchange and planning), which is necessary for chain collaboration. Although there are parties (e.g. branch organizations, service providers, packaging industry) that aim at the development of standards and innovations, it is hard to find chain parties willing to support these chain-wide innovations because of the lack of short-term returns.

For many developing country producers it is difficult to comply with Western quality standards (Vellema and Boselie, 2003; Giovannucci & Reardon, 2001). Small producers are in most cases excluded from direct participation in international chains because of high certification costs (for producers) and high monitoring costs (for buyers). Several instruments can be used to ascertain compliance behaviour of producers (Hueth, 2001):

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

Mechanisms like output quality control and residual claimancy are common in any food chain. Monitoring of supplier processes and even input control are increasingly applied by Western retailers and large food industries in developing countries, as we see in the application of Eurep-Gap by most South-African table-grape producers. Chain quality management is supported by operational management systems. Most relevant management systems in the context of food supply chains are quality systems and logistics systems, supported by information systems (Lancioni et al., 2000; Porter, 2001; Van der Spiegel, 2004; Humphreys et al., 2004). Logistics systems in food chains concern exchange of planning data (harvesting, storage, transportation), post-harvest storage and transportation (cooling, type of vehicle depending on type of product and distances in time), order-delivery cycle (frequency, demands), use of information and (tele)communication technology (internet, cell-phones, etc.). New communication technology such as cell phones can be used for quality data exchange and strongly improve logistics planning, thereby improving the quality of fresh products. In the South African table-grape chain we see major attention for and application of these technologies and systems, although adequate information exchange between producers and exporters should be encouraged.

## **Governance**

International export chains seem to become more concentrated and more tightly integrated when the numbers of participants decrease, as we have seen in the chain in South Africa and in parts of the chain (exporters/large producers) in Ghana. In South Africa we see the emergence of “integrated” chains with hybrid governance structures in which contracts are supported by sophisticated management systems. These chains are able to comply with international customer demands regarding volume, quality and traceability. Quality and certification schemes lead to increasing control and more integrated governance, such as long-term contracts or vertical integration. At the same time they may lower transaction costs. In Ghana producers and exporters are increasingly vertically integrated; however, the large number of out-growers and small-holders is dependent on large producer-exporters to gain market access. International chains are increasingly efficient and able to concentrate their economic power. This means that it is hard for new and/or smaller producers to enter mature markets. In this situation niche markets, such as those for organic or fair trade products, can be a viable option. In particular, in the modern table grape chain in South Africa we see that chain integration goes together with technological and system innovations. Transaction related investments by exporters (in IT and cooling technology) have led to chain integration on the one hand and innovation on the other. Furthermore, in this chain the introduction of standards in packaging and IT has led to innovations throughout the chain. Exporters, IT-companies and packaging industries play a major role in this respect. In Ghana these developments have not (yet) occurred.

Modern market-oriented chains have the tendency to become shorter as intermediaries between producers and chain downstream parties become superfluous because of the emergence of direct trading relationship between large producers (or producer groups) and downstream parties. An example is the transformation of export-oriented producers to producer-exporters in South Africa. Inter-company relationships in these chains are often enforced by investments of processors or exporters (such as investments in cold stores, seeds, pesticides, credits) to decrease delivery uncertainty and increase quality and quantity consistency of deliveries. In the South African table grape chain we see hybrid governance forms supported (although still emerging) by chain wide quality and information systems. In the Ghanaian pineapple chains infrastructures and management systems are still poorly developed, implying vertical integration, so far at least from exporter to large producer.

Small-scale producers, as in the Ghanaian pineapple chain, depend in most cases on downstream parties in the chain, such as intermediaries, transporters or exporters, for their input supplies, credits and market access. Banks are mostly not eager to finance smallholders in general, and more specifically perishable products because of the high risks involved. However, the embeddedness of these small scale

producers in a network of social relationships can provide them with social capital to support their (vertical) business relationships (Coleman, 1990, Uzzi, 1997). Opportunity for producers to establish collaborative horizontal relationships such as purchasing or marketing cooperatives, may deliver economies of scale that may strengthen their bargaining position and allow for joint investments in production, marketing and distribution, as the example of Farmapine shows. Such collective action proves to be rather effective for linking smallholders with major market outlets.

## Further Study

The research is qualitative and explorative in nature. Further (quantitative and explanatory) research may focus on in-depth investigation of the findings/hypothesis stated above.

An interesting research field related to the above study is how supply chain development can be linked to social development. How to bring spill-over effects of chain development to small farmers, out-growers and seasonal laborers is a major point for further study. The question of who benefits (most) from the development of international supply chains originating in developing countries is a very intriguing one.

Another point which has not been fully addressed in the paper is who bears the costs of innovation. As discussed, South African chain companies only were interested in company-related investments, not in, for example, (chain) traceability systems. How costs of these chain-wide systems can or should be divided over various chain parties, national and international, is an interesting question to challenge in further study.

## References

- Bowersox, D.J. and Closs D.J., 1996. *Logistical Management: The integrated supply chain process*. New York: Macmillan.
- Coleman J.S., 1990. *Foundations of social theory*. Cambridge, MA: Harvard University Press.
- Cooper, M.C., Lambert, D.M. and Pagh, J.D., 1997. Supply Chain Management: More than a new name for logistics. *International Journal of Logistics Management*, 8 (1), 1-14.
- David, R.J. and Han, S.-H., 2004. A systematic assessment of the empirical support for transaction cost economics. *Strategic Management Journal*, 25(1), 39-58.

- Deciduous Fruit Producers Trust (DFPT) 2002. Key Deciduous Fruit Statistics, DFPT, Paarl South Africa.
- Fafchamps, M., 2004. Market institutions in Sub-Saharan Africa. Theory and Evidence, Boston: The MIT Press.
- Folkerts, Henk and Hans Koehorst, 1997. Challenges in international food supply chains: Vertical coordination in the European Agribusiness and Food Industries, *Supply Chain Management*, 2 (1), 11-14.
- Fresh Producers Exporters Forum (FPEF), 2003. Market Forces Affecting Industry Returns, Lecture S. Symington, Cape Town South Africa.
- Friedland, W.H., 1994. The Global Fresh Fruit and Vegetable System: An Industrial Organization Analysis, In: McMichael, P. (ed.) (1994), *The Global Restructuring of Agro-Food Systems*, Ithaca, New York: Cornell University Press.
- Gereffi, G., Korzeniewicz, K. Korzeniewicz, R., 1994. Introduction: global commodity chains. In: G. Gereffi and M. Korzeniewicz (eds.), *Commodity chains and global capitalism*, Westport: Greenwood Press.
- Ghana Export Promotion Council (GEPC), 2002. Exporter performance, non-traditional exports by exporter for 2001, Accra.
- Ghana Export Promotion Council (GEPC), 2003. Export of fresh pineapples in 2002, 2001, Accra.
- Giovanucci, D. and Reardon, T., 2001. Understanding grades and standards and how to apply them, In: *A guide to developing agricultural markets and agro-enterprises*, Edited by Daniele Giovannuci, Washington: The World Bank.
- Grapes South Africa, *The Grape Times*, February 2003. 5, Paarl South Africa.
- Grover, V. and Malhotra, M.K., 2003. Transaction cost framework in operations and supply chain management research: theory and measurement. *Journal of Operations Management*, 21(4), 457-473.
- Handfield, R.B. and E.L. Nichols 1999. *Introduction to Supply Chain Management*, New Jersey: Prentice Hall.
- Hueth, B., E. Ligon, S. Wolf & S. Wu, 1999. Incentive instruments in fruit and vegetable contracts: input control, monitoring, measuring and price risk, *Review of agricultural economics*, 21 (2), 374-389.

- Humphreys, P.K., Li, W.L. and Chan, L.Y., 2004. The impact of supplier development on buyer-supplier performance, *Omega*, 32(2), 131-143.
- Lambert, D.M. and Cooper, M.C., 2000. Issues in Supply Chain Management, *Industrial Marketing Management*, 29, 65–83.
- Lancioni R., Smith M., and Oliva, T., 2000. The Role of the Internet in Supply Chain Management, *Industrial Marketing Management*, 29, 45-56.
- Lazzarini, S.G., Chaddad, F.R. and Cook, M.L., 2001. Integrating supply chain and network analyses: the study of netchains, *Journal on Chain and Network Science*, 1 (1), 7-22.
- Marsden, T. (2000). Food Matters and the Matter of Food: Towards a New Food Governance?, *Sociologia Ruralis*, 40 (1), 21-29.
- McDonald, S. and Punt, C., 2001. The Western Cape of South Africa: Export Opportunities, Productivity Growth and Agriculture, 4th Global Economic Analysis Conference, Purdue University, June.
- Omta, S.W.F., Trienekens, J.H. and Beers, G., 2001. Chain and Network Science: a Research Framework, *Journal on Chain and Network Science*, 1 (1), 1-6.
- Pegge, S., 2003. Pineapple and Partners, MSc Thesis, Management Studies Group, Wageningen University, The Netherlands.
- Perishable Products Export Control Board (PPECB), 1999. Deciduous fruit exports from South Africa, 1996 – 1999, South Africa.
- Porter, M.E., 2001. Strategy and the internet, *Harvard Business Review*, 79, March, 62-78.
- Reardon, T. and Timmer, C.P., 2005. Transformation of Markets for Agricultural Output in Developing Countries since 1950: How has Thinking Changed? Chapter in R. Evenson and P. Pingali (eds), *Handbook of Agricultural Economics*, Volume 3A, Amsterdam: Elsevier Press.
- Ruben R., M. van Boekel, A. van Tilburg, J.Trienekens, 2007. Governance for Quality in Tropical Food Chains, Wageningen:Wageningen Academic Publishers, pp 309.
- Sarpong, D.B., 2002. Farm-size, resource use efficiency and rural development: technoserve and small-scale pineapple farmer groups in Ghana, *Issues in*

- African Rural Development, Monograph Series, Winrock International, Arlington, VA, USA. (Data March 1999).
- Spiegel van der, M., 2004. Measuring effectiveness of food quality management, Ponsen & Looijen, Wageningen, The Netherlands.
- Stern, L.W., El-Ansary, A.I. and Coughlan, A.T., 1996. Marketing channels, London: Prentice Hall-International, (5th ed.).
- Thorpe, Andy and Elizabeth Bennett, 2004. Market-driven international fish supply chains: the case of Nile-perch from Africa's Lake Victoria, *International Food and Agribusiness Management Review*, 7 (4), 40-57.
- Trienekens, J.H. and A.J.M. Beulens, 2001. Views on inter-enterprise relationships, *Production Planning & Control*, 12 (5), 466-477.
- Uzzi, B., 1997, Social Structure and Competition in Interfirm Networks: the Paradox of Embeddedness, *Administrative Science Quarterly*, 42, 35-67.
- Vellema, S. and D. Boselie, 2003. Cooperation and competence in global food chains. Perspectives on food quality and safety, Shaker Publishing, Maastricht.
- Vos, T. de, 2003. Information exchange and collaboration in the South African fresh produce export supply chain, PPECB, Cape Town South Africa.
- Williamson, O.E., 1985. The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting, Free Press, New York.
- Williamson, O.E., 1999. Strategy research: governance and competence perspectives, *Strategic Management Journal*, 20, 1087-1108.
- Yin, R.K., 1994. Case study research: Design and methods (second edition), Thousand Oaks, CA, USA: Sage Publications.