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**PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM  
ON FRESH PRODUCE SUPPLY CHAIN MANAGEMENT**

6 to 10 December 2006  
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Edited by  
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**AGRICULTURAL AND FOOD MARKETING ASSOCIATION FOR ASIA AND THE PACIFIC**

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## **Foreword**

This publication constitutes the proceedings of the International symposium on fresh produce supply chain management held from 6 to 10 December 2006 at the Lotus Pang Suan Kaeo Hotel in Chiang Mai, Thailand.

The symposium was coorganized by the Agricultural and Food Marketing Association for Asia and the Pacific (AFMA), Curtin University of Technology, the Department of Agriculture of the Thai Ministry of Agriculture and Cooperatives, and the Food and Agriculture Organization of the United Nations. The symposium was the second in a series of four international conferences held in conjunction with the Royal Flora Ratchaphruek 2006 International Horticultural Exhibition for His Majesty the King of Thailand.

FAO's objective in holding the symposium was to learn about the latest innovations and trends in logistics and distribution, collaboration and coordination within international horticultural supply chains. The introductory part of the proceedings sets the picture of issues at stake for policy makers monitoring supply chains of horticultural products and stakeholders within these supply chains. The editorial provides a summary of the main message contained in each paper published here and draws some policy recommendations to develop competitive agribusinesses and agro-industries within the horticultural sector.

I hope this publication will be useful for academics wishing to read peer-reviewed research in the field of fresh produce supply chain management. It should also be relevant for decision makers in the private sector and government who wish to learn in more detail of case studies of successful horticultural marketing around the world.

He Changchui  
Assistant-Director General and  
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## **INTRODUCTION**



## Opening statement

He Changchui

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Dr Adisak Sreesumpagit, Director General of the Department of Agriculture, Ministry of Agriculture and Cooperatives;

Mr Nelson Buenaflor, Chairman of AFMA;

Dr Peter Batt, Professor at Curtin University;

Distinguished participants,

Colleagues,

Ladies and Gentlemen,

It is my great pleasure to welcome you, on behalf of the Regional Office of the Food and Agriculture Organization of the United Nations, to this important international symposium on fresh produce supply chain management.

In their efforts to diversify agricultural production and in response to growing markets, many developing countries have seen a significant increase in the production of horticultural crops, including flowers. In the Asia-Pacific region, this trend has taken two forms:

- On the one hand, some countries have seen a significant increase in the production of local produce for their growing domestic market. For example, according to FAOSTAT, the production of pumpkins, squash and gourds in the People's Republic of China has quadrupled since 1990 to reach 5 million tonnes in 2004; likewise, the production of eggplants in India has nearly trebled to reach 8.2 million tonnes over the same period.
- On the other hand, some countries have developed specialized production systems to cater for the international market. For instance, Thailand's export value for asparagus has trebled since 1990 to reach US\$25 million in 2004; apple exports out of the People's Republic of China increased eleven-fold over the same period to reach a value of US\$838 million!

FAO considers marketing a vital component for ensuring food security and sustainable agribusiness development. In particular, FAO's work on fostering better marketing conditions for horticultural crops contributes to the Organization's endeavour to achieve Millennium Development Goal number 1 (Eradicating extreme poverty and hunger), which specifically considers poverty and food insecurity as interlinked. Indeed, not only do horticultural crops contribute to food and nutrition security, but marketing such produce also contributes to income generation, thus providing money for food, education, health care, and other basic needs contributing to sustainable development.

The development of market-orientated horticultural supply chains is a major challenge for developing countries and some of the constraints faced by the industry stakeholders

are directly linked to the specific characteristics of fresh produce and cut flowers. These products have a high market value compared with grains, and their labour-intensiveness makes them suitable for smallholder production. However, producing fruits, vegetables or flowers is also considered risky because of relatively high investment costs, strong market price fluctuations and high perishability of the crops, among other factors.

For example, farmers and traders dealing in organic or superior quality vegetables complain that they cannot obtain adequate premium prices from the market for the extra quality produce they supply. At the same time, agroprocessing and supermarket buyers find it difficult to identify and retain producers willing to adhere to their stringent quality assurance schemes. This paradox suggests that there is a problem for supply chain stakeholders to work together on quality management and value creation.

Monitoring, certifying and remunerating quality is thus a major issue which developing countries, development organizations and international organizations need to address in collaboration with the stakeholders of fresh produce supply chains. What is more, it is very important to learn about success stories on how to foster the adequate enabling environment for private sector stakeholders to organize successful supply chains that bring mutual benefits to farmers and traders while addressing the demand of consumers.

It is for this reason that the FAO Regional Office for Asia and the Pacific has accepted the invitation of the Department of Agriculture to organize this international symposium. In collaboration with Curtin University of Technology (Perth, Western Australia) and the Agricultural and Food Marketing Association for Asia and the Pacific (AFMA), FAO is proud to have gathered so many speakers and participants to this event which I hope will be an enlightening forum to disseminate success stories and appropriate tools for good practices of supply chain management of fresh produce.

For us at FAO, the objective of this symposium is to learn about the latest innovations and trends in logistics and distribution, collaboration and coordination within international horticultural supply chains. I hope this symposium will contribute to bringing our knowledge up to date with the myriad initiatives from the field, which FAO is eager to uncover and disseminate.

I also wish that the experiences and lessons learned from this symposium will be used to foster new partnerships between food chain stakeholders and will help us guide policy-makers towards developing sustainable global agrifood marketing chains. Indeed, more efforts are needed in harmonizing safety standards among countries, raising the awareness of farmers and traders about national and international standards, and assessing the impacts of agribusiness- and supermarket-led supply chains on the rural economies of developing countries. The lessons from this symposium will help FAO to develop future programmes and become a catalytic instrument for regional cooperation in this emerging field.

Before I conclude, I wish to thank the members of the advisory committee for their advice and inputs on the preparation of this symposium. Likewise, I wish to thank the

## Introduction

Department of Agriculture, Curtin University of Technology, Asia Pacific Food Online, AFMA and the French Ministry of Agriculture and Fisheries for their support. A special thanks should also be extended to Dr Peter Batt from Curtin University of Technology for taking the lead scientific editorship of this symposium. Finally, I thank you all for coming here to share your expertise on fresh produce supply chain management.

I wish you a fruitful exchange of ideas and information in the following five days.

Thank you.

## **Inaugural address**

Adisak Sreesumpagit  
Director General of the Department of Agriculture  
Ministry of Agriculture and Cooperatives  
THAILAND

Dr He, FAO Assistant-Director General and Regional Representative;  
Dr Peter Batt from Curtin University of Technology;  
Mr Nelson Buenaflor, Chairman of the Agricultural and Food Marketing Association  
for Asia and the Pacific,  
Distinguished delegates,  
Honourable Guests,  
Ladies and Gentlemen,

On behalf of the Ministry of Agriculture and Cooperatives, the organizer of the International Horticultural Exposition or Royal Floral Ratchaphruek 2006, the coorganizer of the International Symposium on Fresh Produce Supply Chain Management and, of course, as the host country, I firstly would like to welcome you all to Chiang Mai which is one of the most beautiful cities of Thailand. I will guarantee that your stay here in Chiang Mai will be very memorable and worthwhile. I also would like to express our deepest gratitude to the Food and Agriculture Organization of the United Nations, and the Agricultural and Food Marketing Association for Asia and the Pacific for selecting Chiang Mai as the venue for this auspicious occasion.

It is a great pleasure for me to be here with you today so as to exchange ideas on the topic of horticultural supply chains. The importance of supply chain management in the current thinking about agricultural marketing is growing. Over the past several years changes in global trading patterns as well as rapid changes in the domestic patterns of trade in many Asian countries have contributed to this issue. Domestically this is driven by increasing consumer incomes and the rapid growth of supermarket chains. Internationally the changes are driven by intergovernmental agreements, both bilateral and multilateral, which encourage increased trade in fresh products within Asia as well as with trading partners elsewhere. Product quality and safe products have become more critical issues in the market. However, it has now become clear that farmers will not automatically benefit through higher prices from producing better quality and safer products. Successful supply chains of collaborating entrepreneurs which must deliver the product at the right location, at the right time, to the right consumers, at the right price, with the right packaging, and in right qualities are more and more essential. Furthermore, the product and its labelling should be credible and guarantee to the final consumer that the product is of high quality, fresh, healthy and safe.

We can now say that a new element has been added to the trading marketing and form the “four Ps”: price, place, product and promotion. This new element is credibility. Consumers, especially the wealthier ones, increasingly demand that what they buy meets the minimum standards of quality and safety, because a safe product is not easily recognized at the first inspection. Hence, trust, credibility, and credible certification in



the supply chain will increasingly become a key factor in the purchasing decisions of consumers. Participants in the supply chain such as farmers as producers, packagers, and traders may not be able to provide such credibility on their own. Each participant group has to understand requirements and expectations of all the participant groups and, of course, the consumers. All of them have to be willing to accept and coordinate among themselves to create such credibility of inspection and certification.

With each of the participants in a supply chain being from such different backgrounds, training and other forms of capacity building within the supply chain are clearly crucial. For all participants, information and communication technologies will become an important factor as new systems of traceability are being developed and tested. It is worthwhile that we have such a symposium on fresh produce supply chain management here today in order to exchange experience, expertise, and learn from each other.

Ladies and gentlemen, I would like to express my gratitude to all distinguished delegates, especially to the guest speakers who come to present their views, their experience, at their own expenses in this symposium, which is organized in conjunction with the Royal Flora Ratchaphruek. We aimed to organize this exposition to commemorate the two grand celebrations, the 60th anniversary of His Majesty the King's Accession to the Throne in 2006, and for His Majesty the King's 80th Birthday Celebration in 2007.

Lots of thanks also go to the Food and Agriculture Organization of the United Nations, Curtin University of Technology, and the Agricultural and Food Marketing Association for Asia and the Pacific for collaborating with the Department of Agriculture in organizing this symposium. I wish you every success in the symposium and staying in Chiang Mai, and hereby I declare the symposium open. I thank you; thank you all.

## **Fresh produce supply chain management: overview of the proceedings and policy recommendations**

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### **Introduction**

In seeking to address the growing income disparity between smallholder farmers and the urban community, development agencies worldwide are giving increasing attention to the concepts of supply chain management.

Fundamentally, supply chain management is a process that seeks to integrate supply and demand through coordinating the activities of many independent actors in the procurement, production and distribution of food products. First and foremost, it requires producers, either directly or indirectly, to deliver to consumers the food that fulfils their expectations. But herein lies the first major obstacle: do producers know what consumers want? In most instances, smallholder farmers do not transact directly with the ultimate buyer; rather, they sell their produce to a downstream market intermediary who is just one of many in a long and complex process of exchange. While advances in communication technology now enable most smallholder farmers readily to access price information, of far greater concern is their limited market horizon. Most smallholder farmers are completely unaware of how globalization is impacting upon their livelihood and how, with increasing wealth, consumer preferences are changing.

Perhaps the greatest and most significant impact is that associated with the emergence of the global retailers and fast food franchises who demand consistent quality, reliable delivery and an internationally competitive price. Herein lies the second major obstacle: how can smallholder farmers coordinate their activities to meet the needs of the institutional market? This is a far more complex problem because it requires a more holistic approach. While most development agencies would agree that quality begins on the farm and indeed, most intervention strategies have largely focused on increasing productivity and reducing losses through improved post-harvest handling, without access to good quality seed, technology and credit to purchase the inputs, smallholder farmers are unable to respond. Even then, assuming that significant improvements can be made to enhance product quality on the farm, smallholder farmers are unlikely to benefit until such time as they are able to deliver the product reliably and consistently to the buyers' specifications. By necessity, this either requires farmers to form collaborative marketing groups or for downstream marketing intermediaries to exert

control through contract farming. Either way, it becomes mandatory to standardize production systems and to implement quality standards. Herein arises the third major constraint: how is it possible to introduce and to implement quality assurance systems for smallholder farmers?

In the papers that follow, each of these three themes is explored in more detail.

### **Market analyses**

For over six decades, business management decisions have been driven by the marketing concept. Stated simplistically, the marketing concept suggests that the principal function of the firm is to satisfy its consumers' needs while making a profit. This assumes two things: (1) consumers have a choice (there are alternative offers) and (2) consumers have the propensity to pay (there is no point bringing products to market that consumers cannot afford to buy). Extending the marketing concept a little further, it soon becomes evident that not all consumers are the same: the food a consumer chooses to eat is determined by the interaction of geographic, demographic, socio-economic, psychographic and behavioural variables. Hughes discusses the importance of segmenting the market and of making different offers to different groups of consumers. As personal disposable income increases, consumers' demands increase. Not only do consumers require more convenient food and better quality food, but the whole concept of quality is enlarged to consider such issues as sustainable production, conservation, animal welfare, workers' welfare and food safety. While there is an implicit assumption that food is safe to eat, consumers' perceptions are influenced by the country-of-origin effect. Moreover, largely driven by dissatisfaction with existing product offers and increasing concerns about global warming, there is steady shift towards local produce which not only looks good but also tastes good. Loeillet discusses the case of the extra sweet MV2 pineapple which in Europe has largely restored consumer confidence. Its success in the market however, was due not only to its superior taste and product attributes, but the implementation of supply chain management principles and strong merchandizing.

The marketing concept traditionally discusses the four Ps: product, price, promotion and place, and the interactions which occur between these variables. In today's market, product form is becoming increasingly important, as consumers look for greater convenience and eat more of their food on the run and away from home. Products such as pineapple, mangoes and orange are seldom available in a form which facilitates immediate consumption. Furthermore, fresh fruit does not always deliver what it promises: apples and bananas might look good, but inside the fruit is bruised or discoloured, too sour, too sweet, too soft, too hard. Product inconsistency and inconvenience is resulting in loss sales, and worldwide, despite the nutritional benefits widely associated with fresh fruit and vegetable consumption, sales are declining.

George, Broadley and Nissen discuss the need for market promotion as an integral component of a strategic approach towards enhancing competitive advantage. Promotion has the potential not only to increase the demand in both domestic and export markets, but to differentiate the product in the market and thereby reduce its susceptibility to price competition. Other related strategies include the establishment of

global marketing companies and collaborating with competitors to form closed loop marketing systems that exploit the seasonality of supply. More fundamental however, is the need to identify and to develop those crops for which producers have a competitive advantage.

Nainwal and Singh continue to explore this theme in their examination of the litchi industry in India. Even although India may be the world's second largest producer of litchi and growers have much experience with the crop, yields are low. Poor productivity is a direct result of issues associated with land tenure and the selection of inappropriate planting material. Farmers are unwilling to sacrifice productivity in the short term in order to replace or to rework trees with superior planting material. Furthermore, the desired post-harvest infrastructure and transportation is not available to move the fruit from the main producing area to the international airport.

In a similar vein, Sudha and Kruijssen investigate the competitiveness of the processed mango industry in South India, citing the lack of appropriate processing facilities as the most significant constraint. In the majority of cases, village level processing plants are too small to have any sustainable market presence and with insufficient capital, they do not have access to the appropriate equipment. Inconsistent demand, the lack of price transparency and information sharing in the market, the lack of trust among the actors, difficult and cumbersome taxation policies are additional constraints.

In a subsequent paper, Nissen *et al.* identify the impediments impacting upon supply chains in Thailand, the Lao People's Democratic Republic and Viet Nam. Due to poor transport and infrastructure, fresh produce supply chains are much longer and include many more participants, significantly constraining the ability of the supply chain to convey accurate information or to return optimum prices to producers. To meet changing customers' demands, farmers need to improve fruit quality. Not only is it essential to match the varieties farmers are growing to the environment and to their customers' requirements, but more appropriate cultivation and marketing practices are necessary to improve and maintain fruit quality. However, as quality improvements often come at significant cost, it will only be sustainable if the market is willing to pay a higher price. Given that prices are ultimately determined by supply and demand, rewarding growers through higher prices can prove problematic.

Kuntarsih *et al.* describe how it is necessary, if growers are to be rewarded for producing superior quality, to develop parallel supply chains. Using bananas as an example, they compare and contrast the traditional marketing system with the improved marketing system. Through improved communication, growers were better able to meet the needs of downstream market intermediaries. Increased returns come about through superior market knowledge, reduced wastage and improved productivity per unit area. Fundamental to their success however, was the establishment of a grower cooperative which sorted, dehandled, washed, dried and packed the bananas. Collectively, growers have started to implement Good Agricultural Practices (GAP) in the field and Standard Operational Procedures (SOP) in the packing shed. The cooperative provides the farmers with a superior bargaining position which enables them to negotiate a better price and the capacity to borrow the funds to pay the farmers with cash on delivery.

In Sri Lanka, Abeyskera and Abeyskera focus on how the alternative supply chain management practices adopted by leading supermarkets have impacted on the performance of existing supply chains. The most significant change has been the emergence of a more dynamic marketing system that is more responsive to consumer needs. At the producer level, supply chain modernization has facilitated the introduction of contract farming and forward purchase mechanisms. However, for efficiency reasons, contract growing appears to favour a smaller number of larger producers who are more capable of supplying the necessary quantities and quality. Potentially this excludes the smaller scale farmers from participating in the supermarket supply chain. At the consumer level, supply chain modernization has resulted in more competitive prices, a wider choice of varieties, improved product quality and presentation.

Punjabi and Sardana report a similar situation in India. Different models for coordinating supply chains are emerging from both the public and the private sector. Irrespective of the driving force, developing supply chains requires a lot of effort to develop linkages with farmers, especially in gaining their trust and motivating them to work. Although developing farmer linkages is easier for those firms that have been involved with farmers over time, usually through input supply or some other means, problems invariably emerge at harvest. “Pole vaulting” is a term frequently used to describe how farmers often sell their produce to a buyer, but not to the buyer who has been assisting the farmer to grow the produce. The motivation for such behaviour is purely economic; the other buyer offers a higher price on the day. Another important issue is the need to dispose of that proportion of the crop that does not meet the buyers’ specifications while still making some profit. Finally, if quality is to be retained, there is the need to invest in post-harvest infrastructure, not only at the farm level, but at the wholesale and the retail level. Invariably, this will be accompanied by a parallel demand for actors in the supply chain to implement a quality assurance system.

### **Supply chain management**

It is widely recognized that if smallholder farmers are to participate in the institutional market there is a need for them to form collaborative marketing groups. Irrespective of whether the catalyst for the formation of the group comes from the farmers themselves (in most instances, one or two farmer-leaders), a non-governmental organization (NGO) or a market intermediary, for the group to succeed, it must offer the farmers something more than what they would ordinarily receive from their existing market intermediaries. For the majority of farmers, their primary motivation is price, but the benefits may also extend to more cost effective inputs, access to technology, access to capital and a range of other community benefits. However, market intermediaries are in business to make money, and thus if farmers are to receive higher prices, they must deliver superior value to their customers. Furthermore, there must be an element of trust, not only within the group, but also between the group and the other actors with whom the group transacts.

In analysing vegetable supply chains in Viet Nam, Cadilhon *et al.* discuss the importance of trust in facilitating the exchange. When exchange parties trust one another, information is more freely exchanged. Greater transparency on prices, activities and market information not only facilitates the joint resolution of conflict, but it leads to greater satisfaction and increased profits for both farmers and market intermediaries.

This in turn leads to a long-term commitment from both parties to the transaction. When both parties are committed to the exchange, both parties believe in and accept the stated goals of the relationship. Both firms show a willingness to exert effort on behalf of each other and express a strong desire to maintain the relationship. Commitment facilitates cooperation, which enables the partners to react better to market information, customers, competitors and external environmental forces. The willingness to cooperate and adapt leads to innovation which is the key determinant of a successful long-term relationship.

Keizer explores the nature of the long-term relationships in the sweet potato supply chain in Bataan, the Philippines, to reveal likewise that trust and cooperation facilitate interaction at all levels in the chain. Despite the imbalance of power that exists between producers and market intermediaries, there is a strong interdependency. The producer depends on the trader to market his or her produce while the trader depends on the producer for a regular supply of produce to secure his or her income. Besides this, traders play a vital role in providing the capital and the inputs which producers need to grow the crop. In turn, the producer is obliged to sell his or her produce to the trader after harvest. Not unexpectedly, producers who were tied to a specific trader through credit or input loans had little capacity to negotiate price and often received prices that were somewhat lower than the prevailing market price. Furthermore, traders reportedly paid higher prices to larger producers than smaller producers, presumably because of lower transaction costs. Due to the lack of transparency in market prices, producers often suspected the traders of acting opportunistically, but an examination of the price margins revealed that for most of the time, traders were offering fair and realistic farmgate prices. Trust and respect was also evident in transactions between market intermediaries. In Tagalog, the indigenous language, when one person has traded with another for many years, the bond that develops between the two is described as *suki*. This means that a person will always do a large part of their business with the same trader. Even when prices are lower somewhere else, the person is obliged to do business with this trader, wholesaler or retailer.

Staying in the Philippines, Baniqued describes how the apparent distortion of prices by traders and market intermediaries provided the motivation to develop an alternative route to market. In order to fulfil the growing demand for fresh produce from the fast food industry, growers were encouraged to enter into long-term contracts with a food processor at predetermined prices. However, when prices in the wholesale market exceeded the contract prices, growers reneged on the contract, thereby disrupting the capacity of the processor to meet their supply commitments. Forced to import in order to retain the contract, the processor embarked upon an ambitious plan to train the farmers and to build capacity through: (1) improving the efficiency of their farming practice; (2) developing a sense of business so that farmers could appreciate risk, opportunities and threats; (3) ensuring that the growers' income reflected all the costs of production, social costs and environmental costs; and (4) nurturing social values. Where all parties share similar values, conflict is more easily resolved and individuals learn to value their work and their contribution more highly, thereby improving their capacity to learn.

Driven by a similar desire to improve individual self worth, Serhalawan introduces the Bali Fresh Women Farmers' Partnership. Bali Fresh is a partnership between a group of

poor women farmers, a supply company and a marketing company to produce, process, pack and distribute high-quality fresh vegetables to the institutional market. In a win-win situation, each of the partners need something: (1) the women need money to invest, technical knowledge and a reliable market for their produce; (2) the supply company needs a market for its seeds, fertilizers, irrigation equipment and greenhouses; and (3) the marketing company needs a reliable supply of quality fresh produce all year round. The key success factors include; (1) sustainability; (2) honesty and integrity; (3) community development; and (4) a revolving fund, whereby credit is extended to group members in the expectation that it will be repaid and subsequently reinvested.

Although it is not discussed as such, the common theme that underpins much of the success for each of the groups discussed thus far is leadership. Leadership should not be confused with power: leaders are able to influence people without needing to resort to power. Leaders establish direction, they align staff, they motivate and they inspire.

Wiboonpongse, Sriboonchitta and Kuntonthong discuss how a farm housewives' group called Chedi Mae Kreow (CMK) was established to make use of poor quality potatoes. CMK turned product previously sold as animal feed (at bath 1–2 per kilogram) into potato chips and snacks worth baht 2–5 per kilogram. To avoid competition with the multinational food processing companies, CMK supplies mostly to schools and local retail shops. While the key success factors were described as the ability of the group to manage the business and product development, the pivotal role of the group leader (and her husband) was highlighted. Through the group leader's social and business networks, it was possible to access support from government agencies who provided technical advice on processing, product development and marketing, and financial support, mostly in terms of production equipment and a packaging machine.

In Ecuador, Blumthal and Gow describe how a key entrepreneur with a passion for agriculture was able to identify and capture an alternative market for long-stemmed roses in the American market. The role of the entrepreneur was the critical success factor, for he provided the market and saw the opportunity when others could not. Furthermore, he possessed the social capital and willingness to bear the burden of risk associated with the development of the alternative distribution channel.

In a second parallel paper, Blumthal and Gow discuss how the employment of a well known and respected farmer was critical in securing other farmers' willingness to engage in contract farming. With little experience in producing cut flowers, let alone producing for an export market, farmers were initially reluctant to participate.

In a similar manner, Dagupen discusses how under the leadership of the founding president, the Valley Cut Flower Growers' Association have established their own enabling mechanisms like regular meetings for production planning, information and technology sharing, problem solving and coordination to meet the needs of their downstream customers. The association members sell their flowers directly to flower shops in Metro Manila, bypassing the traditional wholesale market.

In the case of Normin Veggies, Concepcion, Digal and Uy describe how leadership is provided by each of the farmers who lead the various clusters. A cluster is an informal

group of five to ten small-scale farmers and independent growers who commit to pursue a common marketing plan for a particular product (or set of products) for an identified market. Designated lead farmers act as quality managers and coaches to assist the smallholder farmers in the production and marketing of quality vegetables. Through the clustering strategy, the core values of interdependence, responsibility, commitment and trust are emphasized among all the producers. It is understood that when a farmer is taken into a cluster, he or she is under a strong obligation to work with the group. Failure to meet this expectation can result in the grower being expelled from the cluster.

However, leaders are also people who have the propensity to lead because others accept that by the position they hold or their role in the supply chain, they have a legitimate right to control.

Poonpiriyasup describes how the CP Group, through its vast retail network, is able to engage smallholder farmers in its “Complete Package” programme. CP provides the market and the technology. Participating farmers benefit from a reduction in cost, less risk, increased productivity and a higher net income, providing that they adhere to the production protocols and meet the prerequisite quality standards. To ensure the product is safe, not only for the consumer, but also for the environment and the farmers themselves, product must be cultivated following GAP.

In order to supply supermarkets in the United Kingdom, Heather describes how preferred suppliers must comply with an increasing number of technical specifications including GLOBALGAP, SEDEX, LEAF and Fairtrade. To ensure fresh produce is available in-store, 365 days of the year, supply programmes are established twelve months in advance, outlining from where and how the product will be purchased, the product offer quality, the seasonality of supply, packaging requirements and price. Specifying which varieties are acceptable is a large part of the business to minimize wastage and to ensure that consumers are satisfied with the eating quality of the fruit. To control costs and improve the uniformity of the product received from the various suppliers in more than twenty countries, regular workshops are conducted to share thoughts and ideas. An integral part of this activity is the identification and development of new products (varieties) to offer to consumers.

In Perth, Western Australia, Mercer describes how successful wholesaling requires a good balance between small-scale and large-scale suppliers and a diverse mix of customers to provide the best marketing option for each grower’s fruit. As the supply base continues to consolidate, alliances must be built with large national supply organizations while at the same time, relationships must be maintained with small, high-quality producers. Servicing the supermarkets requires a high level of quality assurance, supply planning, logistics and business management whereas servicing the independent stores requires attention to detail and developing good personal relationships. Not unexpectedly, as the trend towards more direct sales gathers momentum, the role of the wholesaler is under threat. The ability to stay in business is very much dependent on securing the best outlet for the growers’ fruit and being able to add value for the buyers through offering a diverse range of produce, prepacking, quality assurance and in-store product support and promotion. Technologies like refractometers and digital cameras enable market agents to address any quality problems immediately with the growers,



thereby greatly facilitating trust. As wholesalers have the best knowledge of what is happening in the market, they are in the best position to advise growers when to bring their fruit to market, when to pack it and how to pack it.

The market is constantly changing as consumers' needs change and new products and new suppliers enter the market. To remain competitive, producers must be able to respond. At the demand level, producers can introduce new varieties which deliver superior quality attributes or adopt new processes which greatly enhance the shelf life of the product and make it more convenient to use. At the supply level, innovations can be introduced to reduce the costs of production or reduce the amount of product wastage. In an increasingly uncertain environment, Yawson and Aguiar discuss the concept of agility as a mechanism for firms continuously to re-examine how they compete. Agility requires organizations to be flexible and cost efficient. How quickly an organization is able to respond to changes in its social or legal environment, its business network, its competitive environment, its customer needs, technology and indeed how quickly it can adjust to internal changes is a measure of its agility.

In the Philippines, Concepcion and Digal describe how a number of alternative supply chains are emerging in response to the emergence of the institutional market. Invariably, these alternative supply chains coexist with the traditional marketing system, providing producers who are either unable or unwilling to change with an outlet for the produce they have cultivated. However, each of the chains differs in the extent to which producers may actively participate. In the market specialist chain, the product specialist chain and the food processor chain, the farmers' relationship with the buyer remains essentially the same as in the traditional marketing system. In the development agency-assisted chain, small farmers are empowered to learn and to make their own production and marketing decisions. In the producer-managed chain, the farmers participate in making decisions on price, volume and quality, for each of the institutional markets they supply.

Hughes and Cadilhon provide a detailed analysis of KG Fruits Ltd, a cooperative of 80 berry farmers in the United Kingdom who collectively hold a 45 percent share of the British market and supply all the major retailers. From their humble beginning over three decades ago, much of their success is attributed to the recognition by the seven founding members that they were the most able to produce the fruit, but a third party marketing company could market their fruit more efficiently. Moreover, in order to lower the costs of production and marketing, the growers collectively pooled their input requirements. Very early in the evolution of the business, the lack of trust was identified as the biggest risk constraining the overall business. To overcome some of the growers' concerns, the cooperative does not pool fruit: each member's fruit is sold to a specific buyer and the grower receives the price that the sales team were able to extract from that buyer. Growers pack their own fruit and are charged a commission on fruit sold by KG Fruits, the level of commission reflecting the size of sale (i.e. lower commission rates for larger orders). Size is also important to ensure that the cooperative has some countervailing power and to generate sufficient funds to invest in the future competitiveness of the cooperative. The cooperative is governed by a Board of Directors which oversees the commercial business of the cooperative and meets monthly. Membership is not open and new growers must apply and be approved by the

Board. As the cooperative has expanded, the one-member-one-vote rule has been amended to allow larger-scale growers to have a proportionately greater say and ownership in the company. However, the maximum ownership that any one grower may hold has been capped at ten percent. Rather than pass all the profits back to the growers, a proportion of the profits are retained for reinvestment. Should a grower elect to leave the cooperative, the contributions that he or she has made to this account can be withdrawn, thus also providing some capital growth based on patronage. More recently, the cooperative has developed close relationships with two strategic partners, providing the cooperative with an increased presence in the market when their own fruit is not available and exclusive access to some of the world's best planting material.

### **Quality management**

Invariably, when market researchers ask consumers to describe the criteria they most often use in their decision to purchase fresh fruit and vegetables, the two most frequently cited responses are good quality and low prices. While it is also abundantly clear that consumers purposefully make some value judgement, trading one off against the other, the concept of quality often remains elusive. Furthermore, quality means different things to different people. Batt conceptualizes quality at five levels. At its most basic level, quality captures the consumers' requirement for food that is nutritious, safe to eat and true to description. Intrinsic quality considers the physical attributes of the product. Extrinsic quality considers the value that the brand, the package, the place of purchase and the price add to the product. As attributes such as taste, texture and flavour can only be ascertained after purchase, such are described as the experiential quality attributes. The credence attributes are those that consider how the food was produced. With rising income, consumers' concern for the environment, sustainable production, workers' welfare and animal welfare become more influential in their decision to purchase.

In the United Kingdom, Baines and Davies discuss how consumer preferences, concerns, fears, politics and beliefs are presenting new food marketing opportunities based on the nature of food production systems. Ethical consumerism may be only a relatively small sector of mainstream retailing, but in Europe, it is becoming an increasingly important driver of consumer choice. As most of these credence attributes relate to the production and processing environment, they are difficult to verify at the point of sale. Consequently, these credence attributes are embedded in trust, confidence and ethical traceability both in the product and the supply system. Trust is reinforced through the development of standards that objectively address the issues of ethical supply: organics, animal and worker welfare, wildlife and biodiversity, geographic indicators and religious beliefs. From this set of standards, an audit protocol must be developed and a mechanism for inspection and certification developed. Such audit protocols must have the capacity to withdraw certification from individuals who breach these standards and only certified food producers should be permitted to use the brands or trademarks which identify the product in the market.

If the chain between producers and consumers is short and local, then trust can be built up through personal relationships. However, the majority of food producers do not sell directly to the consumer, but distribute their product through some market intermediary.

In business-to-business markets, the concept of quality is very different: product is purchased with the intention of either incorporating it in the manufacture of some other product or with the express intention of reselling it. As a result, not only must the product conform to some predetermined standard (technical quality), but it must be available when the buyer wants it and in the quantity that the buyer requires (functional quality). Should the product fail to conform on either quality dimension, there will be significant implications for both upstream suppliers and downstream customers.

Botden and Terhürne describe the “Executive Flower Management” programme as a means of continuously monitoring the gap between actual performance and desired performance on key product and process performance indicators in flower supply chains. These key performance indicators are based on plant physiological and managerial standards. Early observation of unacceptable differences between actual and target performance can result in prompt and efficient managerial action which enables producers to serve final customers better.

However, performance will not improve if information is not adequately communicated and there is little if any reward in the form of higher prices for producers to deliver a superior quality product. Murray-Prior and Batt demonstrate how the failure of the current coffee marketing system to give the right price signals to growers in terms of different prices for different qualities of parchment is one of the major obstacles towards improving the quality of the coffee produced in Papua New Guinea. Traditionally, smallholder coffee farmers have transacted individually with roadside traders who offer one price to farmers based on the moisture content of the parchment and the proportion of physical defects and waste material. However, as many of the faults in coffee cannot be detected at the parchment stage, those farmers who adhere to prescribed processes for the production of parchment are unlikely to receive any price premium. Traders can only reward those growers who produce superior tasting coffee when they deal directly with the traders and they provide a sufficient quantity of parchment that makes it worthwhile to cup-taste the consignment prior to acceptance. Furthermore, cultural differences between smallholder farmers, the plantation operators and exporters contributes to the perception that lower prices are due to excessive profits in the processing–export sector rather than to any inherent problems with coffee quality.

Given that prices in the market are determined primarily by supply and demand, prices do not always reflect or reward growers for producing superior quality. More often than not, when fruit is in season, it is in peak condition and thus it offers consumers the best eating experience. However, as it is also the most plentiful, prices are correspondingly lower. Conversely, at either end of the season, while the quality is compromised, prices are at their peak. Sudden disruptions in supply, most often occasioned by predicted or chance climatic events, can also result in extraordinarily high prices being paid for very mediocre quality. Without a good understanding of the market dynamics, such variations make it very difficult to promote the benefits of improving quality to smallholder farmers.

While it is widely accepted that quality begins on the farm, Brown *et al.* demonstrate how the majority of mangoes harvested in the Philippines fail to meet the quality requirements of the domestic and export market. Typically, harvested fruit is of poor

physical appearance with scab, insect damage, wind scars and latex burn emerging as the major problems. While growers are very aware of the need to harvest the fruit when the turgor pressure is low, they are often constrained by the need to deliver fruit to the buying station. Fruit quality further deteriorates from the farm to major distribution centres due to overstacking, rough loading and unloading, and poor handling during final sorting at the warehouse. Anthracnose and stem end rot are important post-harvest diseases of mango, especially for fruit harvested during the rainy months of July to November. The fruit deteriorates very rapidly along the supply chain, especially when it begins to ripen. Effective preharvest pest management, careful post-harvest handling, the application of hot water treatment for disease control and improving logistics are among the potential measures to improve the quality of mangoes in the Philippines.

Looking now to the demand side, in penetrating the emerging institutional markets, one of the most significant constraints facing smallholder producers is the mandatory requirement for certified quality assurance systems. In order to protect themselves from the threat of legal litigation, most food manufacturers and retailers now require their suppliers to take all reasonable steps to ensure that the food they sell is safe: safe for the consumer, safe for the environment and safe for the workers. Pattanatorn and Sutton outline the quality requirements farmers must meet to supply supermarkets in Thailand. All suppliers are audited and approved against national and European Union standards, irrespective of the source. Furthermore, random spot checks are undertaken around two times per year to ensure the supplier conforms to the standards established. Traceability is imperative.

Oates discusses in some detail the problems associated with traceability in a transitional economy. At a very basic level, traceability enables the buyer to identify where the product has come from, when it was harvested and where it is going. However, an increasing number of buyers and an increasing number of markets require more detailed information on issues such as Fairtrade, organic and other credence attributes. In the transitional economies where farms are generally small and farmers are often linked to the market through collector agents and other intermediaries, traceability continues to be problematic. In most instances, while it is possible to trace back to the collector level, it is seldom possible to trace back to the individual farm and even more difficult to trace back to the input level. The quality of information, record keeping and the authentication of records are other areas that need to be addressed. Records are invariably kept on pieces of paper and in most cases, there is no formal record keeping system. As the consignment moves through the system, these little pieces of paper get lost and mixing of the produce from various growers invariably occurs to optimize transport costs and minimize handling. Furthermore, it is important to understand that traceability on its own does not assure the safety of a product. If traceability is to contribute towards producing a safer product, a robust quality management system must already be in place. As price incentives continue to be the principal factor encouraging the adoption of quality management systems, such systems can only be supported when all members of the supply chain are committed.

Shepherd and Gálvez discuss the numerous constraints to the production of safe food in the transitional economies. In the wholesale market where traders buy from unknown producers, it is exceedingly difficult to trace the product back to its source. While some

grading is carried out, usually on the basis of size, there is little quality differentiation as traders are rarely able to buy anything other than “fair average quality” and thus most are unable to provide the necessary price incentives for farmers to improve quality. Most traditional marketing systems are not equipped to handle products of different qualities en route to the consumer and even if it were possible for traders to buy different qualities from farmers, there is often little quality differentiation by the time consumers make their purchase. At the farm level, farmers face problems with polluted water and other contamination. They have inadequate information about the dangers of bacterial infection and pesticide misuse and as most farmers are illiterate, they are forced to rely on the local pesticide retailer as their main source of information. Pesticide use is often encouraged by horticultural produce buyers because this leads to “attractive” fruit with no blemishes, but recommended practices are rarely followed. Produce is often harvested too soon after the last chemical application. In several countries, traders are constrained by the poor infrastructure of the markets in which they operate. Poor structural facilities are often compounded by inadequate management that results in haphazard operations and unsanitary facilities. Waste disposal arrangements are often poor and many post-harvest activities frequently take place on the bare earth.

While Ketelaar praises governments in Asia for having initiated programmes that promote good agricultural practices, in most parts of Asia, farmers continue to rely heavily on pesticides to produce their crops. While new options for pest control including biopesticides, the better use of parasitoids and natural enemies, and improved seed technology become more widely available, the utilization of these integrated crop management programmes is often constrained by the GAP programmes which are very biased towards pesticide application. In a similar vein, Vellema and Jansen describe how the standardization of crop production systems through the adoption of GAP may stifle innovation in the long term.

While the adoption of quality management systems in the food industry is primarily encouraged to assure food safety, quality management systems can also contribute to the profitability of the firm by reducing wastage, the costs of reworking or regrading product that fails to meet specifications and reducing the costs of transacting with dissatisfied customers. However, the adoption of quality management systems may also provide the firm with an opportunity to differentiate its product in the market through pursuing organic or Fairtrade accreditation, or promoting the product under a protected geographic indication (GI).

The value being placed on environmentally and socially beneficial production systems generally supports the entry of smallholder farmers into the global market. However, much depends on the capacities and responsiveness of the farmer groups. Using a case study from Indonesia, Suarja discusses the various constraints that impacted upon the capacity of cashew growers in Flores to attain organic certification. While the farming systems practised by the farmers typically did not use chemical fertilizers or pesticides, the farmer groups had to be mobilized and trained. The formation of farmer groups was critical for the delivery of the associated training programmes, to spread the costs of inspection and certification and to improve the farmers’ bargaining position. Moreover, certificates were held by the groups, not by individual farmers. Each farmer group had their own administrative structures and rules, and each group was further divided into

three or four subgroups based on geographic location or administrative boundaries. From each of these subgroups, one or two members were chosen to be local inspectors. While each of the groups achieved the standards and were accredited as organic, without the prerequisite training on sorting, grading and processing, product quality declined. Without being able to meet the quality standards, farmers did not receive the anticipated price from the sale of organic cashew nuts. Furthermore, constant fluctuations in the price of nuts and a dramatic reduction in yield after a long dry season accentuated by pests and diseases caused farmers to become disillusioned.

In contrast, Uathaveekal describes how organic-certified quality was achieved through the implementation of contract farming rather than relying on loosely structured cooperative farmer groups. Given the small size of farms and the need to create buffer zones around each farm, individual farmers would not have sufficient land left to farm without entering into a collective contract farming agreement. Before commencing production, the proposed site was repeatedly checked to assess its soil conditions, the availability of water and to ascertain its past cropping history. Only then were the groups mobilized and training provided. Before providing any agronomic training, the groups were first taught how to manage themselves. The groups selected their own leaders and their own management committee. Managing the group dynamics was important, because it was the group that was certified, not the individual. Hence if anyone in the group failed, the whole group failed. To maintain quality, a number of agronomists were employed to provide continuous training and on-the-spot problem solving. Furthermore, in order to ensure that everything was done right according to the production protocols, regular internal audits were undertaken on a daily basis.

According to Vieira, Aguiar and Maia, Fairtrade is an example of a set of private voluntary standards that establishes a strong link between smallholder producers and consumers. Fairtrade certification not only helps producers from the transitional economies access international markets, but it enables them to gain better margins and to facilitate community development. Fairtrade attempts to overcome some of the market imbalances for smallholder farmers by creating specialist marketing channels and networks that operate in parallel to the existing trading system. Those engaged in Fairtrade have to follow the basic principles: (1) direct purchasing from farmers; (2) transparent and long-term trading relationships; (3) agreed minimum prices, and (4) a focus on development and technical assistance through the payment of an agreed social premium. Firms engaged in Fairtrade are perceived to be more socially responsible and concerned about the environment, animal welfare and human health. Nevertheless, if Fairtrade is to be sustainable, the producers must offer a consistent quality product to the market and endeavour to optimize production. Not only is it very expensive to seek formal accreditation under Fairtrade, but some argue that it perpetuates the rich country–poor country syndrome. As the Fairtrade system relies upon the goodwill of a small group of consumers, there may be no domestic or alternative market within the developing countries. Accreditation may even favour the diseconomies of scale, encouraging smallholder producers to remain small.

While Fairtrade operates primarily to support the smallholder producers, it does not preclude or prevent smallholders from selling to the multinational food manufacturers and retailers. Indeed, the decision to engage the multinationals has resulted in a massive

growth in market share. According to Rosenkranz, sales of Fairtrade products now exceed US\$1 billion per annum and are growing at the rate of 37 percent per annum. Not only is the market expanding but so also is the range of product. Fairtrade does not transact with individual producers, but rather with collaborative producer groups. These groups must be democratically organized, there must be producer participation and they must be transparent. Under Fairtrade, the farmer should always get a higher price or at least a sufficient return to recover the costs of production. Furthermore, there is a premium, but this premium is not for the individual farmer: it is for community development activities. The producer group must have the potential to export, either by themselves or through a trader. Ideally, the group should be directly involved in the commercialization of their product through either quality control or product consolidation. While Fairtrade products are not organic, there are environmental standards that must be met. As the use of many pesticides are forbidden, producer groups must have an internal control system to show what pesticides have been applied, how they were applied and what impact, if any, this had on the environment. Fairtrade products must not have been produced using child labour or forced labour: labour rights and conditions must meet prescribed standards.

Ekkayokkaya provides an overview of the process associated with the registration of a protected geographic indication. A geographic indication (GI) is a mark or a sign which indicates a link between a location, region or area and the perceived quality of a product. When producers use the name of this region with their product, it sends a signal to the consumer that the product originates from this geographic origin and has some specific quality characteristics. Geographic indications are a unique form of intellectual property because they belong to a community rather than to an individual. Therefore, they cannot be sold to someone else. Not unexpectedly, in order to get a GI registered, producers must be able to demonstrate that the product has a specific link to the region in terms of quality, character or reputation. Furthermore, if the GI is to be protected, the community must establish some minimum quality standards to ensure the consumers get what they expect.

Finally, two papers show how investment into agroprocessing facilities can contribute to achieving higher-quality produce. Estigoy shows how cold storage and refrigerated transport allows extended shelf life of fresh vegetables in the tropical climate of the Philippines. Likewise, the detailed study by Giametta, Morabito and Giametta demonstrates the capacity of optical graders to distinguish different fruit calibres so as to extract as much price differential from the supply of different grades of fruits.

### **Policy implications**

In the light of the results reported above, the following policy recommendations to governments can be suggested:

- Governments should provide infrastructure facilities and public utilities to enhance the efficiency of producers and market stakeholders;
- Access to financial facilities at the village level should be improved to encourage greater participation of rural households into high-value agricultural production;

- Improving extension services is also essential in order to provide information to growers so that they are fully aware of the opportunities of the market as well as the most efficient techniques of production, crop establishment and management, transportation and storage;
- Governments must provide an enabling environment for small farmers to group together in order to avail some of the economies of scale that larger farmers have when dealing with buying agents;
- It is essential for governments to provide a conducive environment for private sector investment. Amending current laws regulating the marketing of agricultural products can go a long way towards encouraging private sector investment into food marketing. Several national governments have achieved a great deal of success on this front, but more effort is required;
- Governments need to work with the private sector to develop standards for food safety and higher quality. Setting mandatory safety standards for fresh fruit and vegetable will enable organized retailing and other agribusinesses to set up their own robust quality assurance schemes for fresh produce, which are stricter than the government standards. It is very important for the private sector to meet such quality requirements to be competitive;
- Investments into post-harvest management and agroprocessing at farmers' level should be encouraged. Historically, post-harvest management has not been given much attention in government extension programmes. In a changing market, post-harvest management needs to be an important part of government extension programmes if farmers are to participate in modern value chains and to meet the quality requirements of supermarkets and other industrial buyers. Similarly, governments should create the appropriate enabling environment that will lead agribusinesses to invest into their supply chains: for example, lower import taxes for reefer trucks and other logistical equipment will encourage more investment in this area;
- Developing linkages between small farmers and their customers is essential. The government sector, donor groups and NGOs can facilitate the development of linkages between small farmers and supermarkets. It is important to initiate projects with public-private partnership encouraging the involvement of small farmers in modern value chains by providing training in post-harvest management and collaborating input supply and credit. The supermarkets are at the stage where they are setting up farmer linkages, and are likely to continue in the long run. Initiating such projects will ensure the participation of small farmers in modern value chains.



## **KEYNOTE ADDRESS**



## **Principles of supply chain management and their adaptation to the Asian horticultural sector<sup>1</sup>**

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### **Abstract**

*Supply chain management refers to the coordination and alignment of materials, financial and information flows for all activities and processes involved in a supply chain. Broadly speaking, a supply chain describes the full range of activities that are required to bring a product or service from conception through the different stages of production and processing to deliver superior value to the customer at least cost to the supply chain as a whole. Supply chain management encompasses all those activities associated with sourcing and procurement, production scheduling, order processing, inventory management, warehousing and servicing customers across the many independent firms involved in the distribution of food. While the concept of supply chain management is not new, its application to the fresh produce industry is more recent. Increased competition arising from the deregulation of global markets is forcing food manufacturers and retailers to give greater consideration towards ways of reducing costs while simultaneously fulfilling consumers' demand for superior quality. With the increasing need to assure consumers that the food they intend to consume is safe and nutritious, the food industry is moving away from the traditional means of buying towards a more direct and reliable means of procurement where buyers exert greater control over prices, quality and production methods. Unable to respond to the demands of the institutional buyers, there is a very real risk in the transitional economies that most smallholder farmers will become increasingly marginalized. The lack of incentives, the added costs, the lack of knowledge and the inability to make appropriate investments will inevitably result in a dualistic food distribution system where smallholder farmers will face diminishing returns. To break away from the commodity trap and to enter higher value markets, smallholder farmers need to consolidate and differentiate to add value to their product offer. A range of support mechanisms will be required to overcome many of the impediments and to facilitate this transition.*

### **Introduction**

Ladies and gentlemen. Welcome to this symposium. I hope that in the next 40 minutes or so that I can give you an introduction to some of the principles of supply chain management, and do so in a manner that will be both practical and interesting for you. I would like to give you first a brief overview of supply chain management concepts, to look at some of the drivers for supply chain management, the implications for producers, and the ways and means that producers can respond. Given the fact, too, that

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<sup>1</sup> The following paper is an edited transcript of the keynote address delivered to the International Symposium on Fresh Produce Supply Chain Management

I am responsible for the editing of the proceedings and most of you have communicated with me at least indirectly, I have had the opportunity to read your abstracts and the papers that have been submitted thus far. I hope to draw on some of the material to provide an overview and perhaps even a summary of some of the key points that I hope will emerge and some of the strategies that producers might then embark upon in order to improve their relationships with downstream customers.

### **Supply chain management: a definition**

I would like to begin with a definition of supply chain management. Supply chain management refers to the coordination and alignment of materials, financial and information flows for the activities and the processes that are involved in a supply chain (Simchi-Levi *et al.*, 2000). I would like to draw on some of the key words from this definition and to elaborate on them, because they are important in the context of this symposium.

Supply chain management refers to coordination – it is a process. It is a means by which activities and processes are coordinated and brought together. Now, if we are going to coordinate, there must be someone somewhere in the chain who is responsible for that. Much of the literature talks about the role of the supply chain captain. Someone has to be the leader. If someone is to lead and if someone is to control, there must be a flow of information. If activities are to be coordinated, then for the participants who are involved in the process, there must be rewards. The rewards flow in terms of the financial benefits that the various actors in the supply chain receive. So, when we think about supply chain management, from this definition, we need to think about the actors, the people who are involved in the supply chain, the firms, and the individuals; the processes or the activities that are involved; and the resources that each of these actors need in order to perform the activities that they perform. So this is a very holistic definition.

We then go on to describe the activities that are undertaken in terms of supply chains. Supply chains embark upon a full range of activities that are required to bring a product or service from conception through to the different stages of production and processing. When we look at this word conception, this indicates or suggests to me that we are in fact dealing with a proactive process. It's not reactive; it's proactive. And we need to appreciate that in business-to-business markets, this is indeed the way in which most business-to-business markets operate. Both participants, the buyers and sellers, are interacting with one another. There is a process of discussion, a process of coordination, and it is this process that allows products to be conceived. As we will talk later, the fact that both parties are working together in introducing and launching new products significantly improves the success of those products and significantly reduces the costs of new product development.

See also the two key words occurring towards the bottom of this activity statement: supply chains function fundamentally to deliver “superior value” to customers. When we consider value, we need to stop to think about what value is. Perhaps the best way I can describe value is the quality–price trade-off, the compromise that buyers make each and every time that they purchase fresh fruit and vegetables. Buyers look for the best

value, and in what is becoming an increasingly international environment, we need to recognize that the benchmark is constantly being lowered in terms of lower cost. Hence, as producers seek to reduce cost, they must simultaneously seek to improve quality. Such a strategy is very difficult to achieve. Porter (1980) suggested that businesses fundamentally have two business strategies: to differentiate or to reduce costs, and when they try to achieve both they invariably became stuck in the middle. They are no good at anything. Hence, trying to improve the performance of supply chains is not an easy task. There is conflict in the exchange process, and we will talk about the conflict and power that emerges in the supply chains a little later.

If we are going to coordinate, what sort of activities are we going to coordinate? We need to appreciate that these activities begin not just at the production stage, but they go way back, much further back. They go right back to the procurement of the inputs that are required for each of the various production processes. A firm cannot hope to be internationally competitive if the firm does not have internationally competitive suppliers. This becomes a critical dimension in understanding how supply chains operate. If farmers are to produce good quality products, the farmers must have good quality inputs. They must have the seed of the right variety and of the right quality, they must have the fertilizers, they must have the chemicals, and they must know that the quality of the products that are delivered to them will ultimately deliver the product that the consumer requires.

By definition, supply chain management is also involved with production scheduling. In business-to-business markets, we need to understand that the three key dimensions that customers require are quality, reliability of delivery and competitive price, in that order. We must appreciate and understand that it is the business-to-business market within which most of the exchange processes take place and that the exchange process incurs costs. There are various costs associated with order processing, inventory management and warehousing; ensuring that sufficient quantities of product are available to meet the needs of downstream customers. However, to differentiate our product offer from that of our competitors, we need to look for ways in which we can better service customers. What can we do that will add value? How can we do that across the many independent firms that are involved in the supply chain? The key word here is independent. We need to recognize that the seed suppliers, the fertilizer input companies, the chemical companies, the farmers, the market intermediaries, the food processors, the retailers are all independent businesses who are aspiring to achieve their own goals. Somehow, we have to coordinate the goals of the different actors, the different activities, and all the different resources that these actors need.

To coordinate all these different players, there are two key mechanisms we can use to achieve this. We can of course do it through the market, where we let supply and demand rule and determine how resources will be allocated. However, in the fresh produce industry this is particularly dangerous because the quality is highly variable, the quantities of product that are available are highly variable, and the range of product available may not necessarily meet the needs of the customers. As we are discovering more and more today, we are relying less upon the free market as the mechanism of allocating resources or resource use. If we move then to the other extreme, we move to a hierarchy. If we move to a hierarchy, we have control through ownership. We don't

have a choice anymore, because we are told what we are to do. Somewhere in between these two extremes of the free market and the hierarchy is what I can best describe as the relational marketing paradigm and it is within this relational marketing paradigm that we see the majority of the exchange processes taking place. Here there is a degree of hierarchical control, yet there is also the independence associated with the free market.

It is at this point that I will probably make what is the most controversial statement of this presentation. After all, isn't that what a keynote speaker is supposed to do? Since the 1950s, marketing has taught us that the "customer is king". What the customer wants, the customer gets. Why is it then when we start to talk about supply chain management in the fresh produce industry, that we suddenly start bashing the retailers and the food processors? They are the customers and customers have a legitimate right to command the supply chain. The customers are the supply chain leaders and we need to recognize that because the customers are the supply chain leaders, they have the power – they have the means to control the supply chain. When we start to talk to farmers and producer groups, we need to recognize that producers make decisions about who they intend to sell their produce to. Just as the customers make decisions about who they are going to purchase the product from, farmers need to make decisions about to whom they are going to sell. If our category managers or our retailers or our food processors make demands, then we make choices. We decide to supply or we choose not to supply. If we choose to supply, then we have to abide by the rules that the customers set. Remember: what the customer wants, the customer gets. If we don't supply it, in a global economy somebody else will and that is the reality of the market.

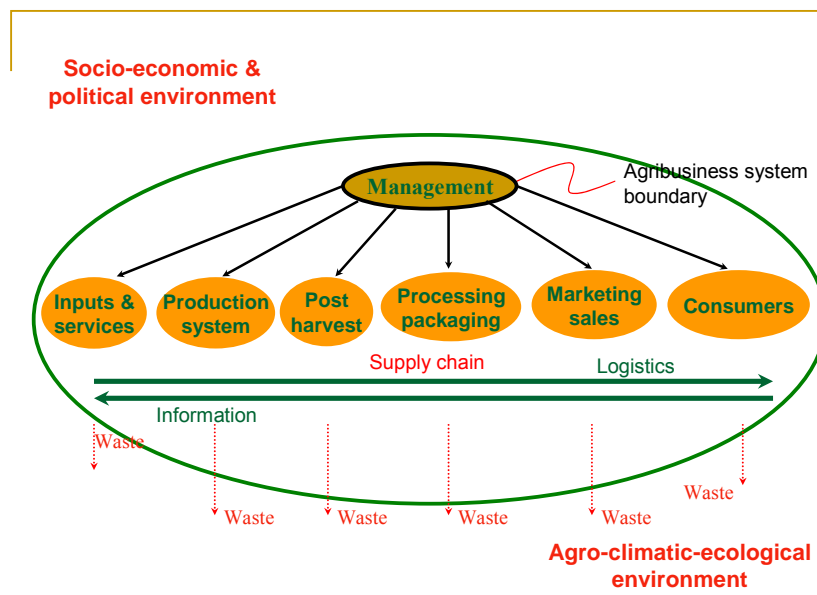
When we think about supply chain management, we need to look at it in the context that supply chain management is fundamentally about delivering superior value to customers at the least cost. In order to do this, we need to look at the supply chain within the context of an agribusiness system, for this brings together the many actors and the many activities and the resources that these actors require to perform the activities.

Figure 1 below is just one model that we can use to explain this. This model is an activity-based model where we look at the inputs and the services that are required to provide the chemicals and the fertilizers and the seeds and the fuel and the equipment and the machinery and the infrastructure to the producers who then utilize those resources in various ways to produce the products that then move on through the post-harvest system, through processing to packaging to marketing to ultimate consumption. We need to appreciate that around each of these activities there is a boundary and a number of both internal and external factors, some of which we can control and some that we cannot.

Management theory tells us that managers plan, organize, coordinate and control. Therefore, supply chain management is all about planning, organizing, coordinating and controlling all the various activities and processes along the supply chain. If we are to do that, we need to recognize that there are factors which are external to this system that impact and influence the things that are undertaken. There are various social, economic and political forces, which we cannot control, that impact the decisions that we must make. As we are dealing here with agricultural products, products which are to varying

degrees dependent upon natural resources, sunshine, rainfall, etc. there are some things that we cannot control. We must acknowledge therefore that we are impacted and influenced more by the agro-ecological environment than by any other factor. If we are going to coordinate, there has to be a flow of information. Product will move down the supply chain from the point of production to consumption. Information, of course, moves back up the chain from consumption to production, allocating resources in ways that will bring greatest profitability to the various actors in the supply chain. However, we must acknowledge that there are various impediments in this process. When these impediments arise there is wastage. Product fails to conform to standards or product fails to meet the customers' expectations because of poor handling, poor production and inadequate knowledge. These are issues that I will continue to explore in a moment.

**Figure 1: The agribusiness system**



Source: McGregor (1998)

### **Drivers for supply chain management**

In reality, we need to think not so much about supply chains, but about supply nets. We need to think about things as they occur within the context of networks. This is where we employ what the literature describes as the domino effect. When someone in the chain makes a change, this will have implications both upstream and downstream.

Markets are constantly changing. Supply chain management is not new. It's been since World War II, and was first employed by the Japanese in terms of their manufacturing systems and then picked up by the Americans. However, in terms of the fresh produce industry, supply chain management is a relatively new concept.

Why all the sudden interest in supply chain management? Supply chain management fundamentally enables firms to respond more effectively to the competition. We need to

recognize that within the environment in which we are currently operating, competition is intensifying. It's getting harder and harder to make a dollar. As a result of GATT and the World Trade Organization, deregulation of the market and the removal of tariffs and taxes, and the technical barriers to trade are resulting in more and more lower-cost producers entering the market. The costs of production are falling. This is a global trend that we see happening for all agricultural products. Agricultural prices are declining. We also see within the marketplace, aggregation and consolidation within the buyers, driven by the desire to achieve the economies of scale that lead to them becoming more competitive. With the decline in trade barriers, companies who face saturation in their domestic markets are expanding. We see retailers, food manufacturers and food processors coming into Asia in enormous quantities, because Asia is in reality the only area of growth in the global economy.

We must also acknowledge and accept the role of technology in terms of the impact that this provides to fresh produce supply chains through improved transportation and logistics: the capacity and ability through modified atmosphere packaging and storage to move products from one continent to another with minimal decline in product quality. We need to appreciate the improvements in communication technology that, at the flick of a switch, enable me to find out what is happening on the Chicago commodities market today or the New York coffee market right now. I am in touch with the markets in a way that we have never been able to do before. We have information in real time.

This in itself becomes a key issue when there is so much talk today about the lack of information in supply chains. I disagree. I think there is more information in supply chains than we have ever had before. However, it's the type of information that is important. Price information: farmers can't react to that. You cannot suddenly turn on a tap and have tomatoes available tomorrow: it takes time. What we do need is strategic information about what everyone else is doing and this is the most difficult information to achieve.

We also need to appreciate the role and the function of biotechnology in terms of the gene transfer technologies that enable us to produce products which have an enhanced shelf life or products, which through incorporation of the Bt gene, allow us to reduce the quantities of chemicals applied. We also need to accept and to acknowledge the role of functional foods and some of the great work that has been done to enhance the nutritional quality of the food that is available to consumers. I personally believe that we have seriously mismanaged the whole genetically modified organism (GMO) debate and allowed the minority to hijack the potential benefits for mankind and our environment.

### **Implications for producers**

I make no apologies for being a producer-orientated person and I think, in the context of this symposium, our principal focus here is on the producer. How can we enhance or facilitate linkages between producers and downstream market intermediaries? From the producers' perspective, let us appreciate and understand that the producers are dealing with fewer and fewer customers. Our customers are consolidating and aggregating and thus producers have fewer choices. Our customers have more power and they are more



demanding. But remember too that they have a right to determine what they want. Remember, customer is king: what the customer wants, the customer gets, and if you cannot supply, somebody else will.

We also need to appreciate that for the customers themselves, the competition exists not so much within the supply chain, but more between the supply chains, as our customers try to carve out a niche in the market. In order for those customers to stay in business, they need to develop new products and, increasingly, our downstream customers are looking to their suppliers as their source of differentiation.

The customer is king. The customers do have a legitimate right to reject product that does not meet their specifications and to impose penalties on suppliers who do not meet their specifications. We must understand in most cases that the customer is also a supplier to another downstream customer who is in turn supplier to the customer's customer's customer. As I spoke before about the concept of the domino effect, if I can't supply, my customer can't supply and his customer then has to source the product from somewhere else. This is not acceptable in the marketplace today.

In order for suppliers to become a preferred supplier, suppliers must make investments. They must invest in their customers. They must invest in the production capacity, the infrastructure, and the information and communication technologies that are necessary to communicate with their downstream customers in real time, and suppliers must implement the quality assurance systems that are required by the customers or the customer's customers. These are not optional; these are choices. Producers choose to transact or they choose not to.

So, what's in it for the producers? What benefits does supply chain management deliver to producers? Quite clearly, because of the improved communication between the customers and the producers, there will be an improvement in product quality, both in terms of the technical specifications of the product, its ability to meet the downstream customer's needs, and in terms of the functional quality dimensions. Functional quality relates to the reliability of delivery, our capacity and our ability to deliver the product consistently and reliably to downstream customers. For producers, if we are able to do this consistently and reliably, then we become preferred suppliers, and we must aim to become preferred suppliers, because once we are a preferred supplier then we have access to the market. As the market moves further and further away from the wholesale market where prices are determined by supply and demand, then it gets harder and harder for us to obtain market information. It is only when we are actively participating in the supply chain that we actually know what is going on and we get the information that we need to make decisions. Not unexpectedly, it's on the basis of this information that we make the decision to invest. As we have seen, these investments are necessary to improve the linkages between producers and downstream customers. When we deal with these customers, there is less risk. With less risk there is the certainty that we can make these investments. There is also reduced product deterioration. There is less waste, there is greater efficiency, there is greater profitability.

## **Impediments to supply management**

So why doesn't it happen??? What are the impediments to more effective supply chain management? One of the most important impediments is the inequitable sharing of value. We need to recognize, as we have already discussed, the importance of buyer power. We need to acknowledge and to accept that the buyers have the power. They are able to control prices. They are able to control quality and they are even able to tell farmers how they should produce, what technologies they must employ, what varieties they should cultivate and what chemicals they should apply. The key issue here relates to the concept of fixed value, because with the removal of trade barriers we are now dealing with the lowest cost producer. The lowest cost producer sets the benchmark. Against this benchmark there is a limited or a fixed pie that needs to be divided amongst all the supply chain actors or participants. This is where the difficulty arises. This is where the problems and the inequities emerge. The size of the pie is fixed: it is how we divide the pie that is the key issue.

We need also to recognize that there is often a lack of incentive within the supply chain for producers to improve product quality. Again, we need to appreciate and to understand that prices in the fresh produce industry are determined primarily by supply and demand, and I would argue here that it is supply that is the critical factor. This in turn is influenced by climatic adversities and chance events. Demand is relatively fixed. There are occasions, however, when there are peaks in demand – red roses for Valentine's Day, for example; turkeys for Thanksgiving – but generally supply is the factor that will determine prices. This becomes problematic for producers, because producers generally receive higher prices when the product quality is poor because of some chance event such as heavy rain, cyclones or some other adversity that has reduced the supply. Price goes up, but it doesn't go up for good quality; it goes up for poor quality. Most producers also acknowledge that the quality that is produced at the beginning of the season and the end of the season is poor. The best quality is produced in the main season, but this is when the product is most abundant and the prices are lowest. This makes it problematic to deliver the correct price signals, but what also starts to emerge here is the need for us (producers) to understand the dual role that customers play in the supply chains.

Our customers are not only buyers, they are also suppliers or resellers, and it's the conflict between buying and selling that creates most of the inequity that we see within the supply chains. Buyers can only reward producers for better quality if they in turn have customers that are willing to pay for it. In Indonesia, for example, most farmers sell through what is described as the *tebasan* system. They sell the whole crop in the ground without grading. Our experience has shown that when growers do take the time to harvest the product and grade it, they don't necessarily get a better overall price, because they have to find a means for disposing of the second grade product. If they don't have a customer who wants it, they will not be rewarded for producing superior quality product.

We need to recognize that there is a lack of credit that impacts upon the supply chain. The majority of small farmers have no collateral. They can't borrow from the banks. The only people that they can borrow from are their downstream market intermediaries,

and so we have this concept of embeddedness where the growers find themselves locked in or tied into relationships with downstream market intermediaries. They no longer have choices. Their hands are tied and we know that these market intermediaries often do take advantage of the growers with exceptionally high interest rates. But what choice is there? What can the farmers do without appropriate financial arrangements? We find that if farmers don't have the finance, then they can't invest in the production inputs and the production capacity that they need to be able to guarantee reliable delivery to downstream customers. They don't have the infrastructure, the cool storage and the refrigerated vehicles to maintain product quality. They don't have the funds to invest in quality assurance systems or information technologies. In other instances, when the farmers do transact with the multinationals, the terms of trade may be from 30 to 60 to 90 days. The farmers can't afford that length of credit. In most cases we are dealing with small subsistence farmers who rely upon agricultural outputs as their main source of income. This income, in turn, is used to meet the household expenses: provide food for the family, clothing, medical expenses and school fees. To put more money into the farm, the family has to do without. Again, our hands are tied.

With small subsistence farmers, we need to appreciate that there is this concept that can be best described as the jackpot mentality. Farmers stay with what they know because they lack strategic information. They don't know what else to do. They don't have the knowledge, and they do what they do, on a wing and a prayer, hoping that somewhere else, a competitor is going to get smacked out. A typhoon, heavy rain, the lack of rain, high temperatures, low temperatures: some adversity that will reduce supply and cause the prices to go up. On the one hand, we see farmers unable to take risks, but yet on the other, this is exactly what they do. Small subsistence farmers are the biggest gamblers in terms of this hope, this expectation, that at some point in time, "I am going to hit the jackpot."

We also need to appreciate that there is a lack of information. As I have already suggested, it's not price information – farmers talk among themselves and in most developing countries, someone in the village has access to a mobile phone. Information is limiting in terms of production technologies and in terms of the marketing options. What we so often see is the lack of awareness of the market needs. The farmers' marketing horizon often goes no further than the trader with whom the farmer transacts. They don't know, in many cases, what the product that they have produced ultimately looks like when it gets to the market. They don't see how the product has deteriorated. They don't see how the way in which they have mishandled the product impacts on its appearance. For example, mangoes. We know that mangoes get sap burn. Producers in the Mekong River Delta were totally surprised when we took them to Ho Chi Minh City to see how their product looked three days after they had harvested it. Most farmers had never seen sap burn, because the product has left the farm before the sap burn has any impact. If farmers don't know, they don't appreciate that what they do impacts upon the quality of the product. They don't see the need to make changes.

Then there is the lack of commitment. The lack of commitment at grower level often relates to his or her social commitments or social obligations. For example, when there is a death in the village, the whole village stops. They forget about the fact that somebody downstream is expecting their product. They fail to deliver. The customer, or

the customer's customer, must then find an alternative source of supply. Then there is the time horizon: the fact that the growers themselves are very short-term orientated. They don't look at the capacity or the need to invest now to collect later. They don't have a choice: they don't have options.

Historically, because of the lack of knowledge and the inability of small subsistence farmers to understand the dynamics of the market, most farmers believe they have been exploited by their downstream customers. In turn, the farmers act opportunistically to seek to take advantage of the traders. There is the concept of topping, where the farmers put the rotten stuff at the bottom of the sack and then put the nice stuff on top. In Papua New Guinea, for example, before they sell the coffee, they throw the bag into the river so that it picks up a little bit of extra water. All of these things reduce the efficiencies within the supply chain.

### **How do small producers respond?**

What I hope you can see emerging from our discussion so far is the emergence of a dual marketing system. Producers can continue to supply the fresh fruit and vegetables that they grow to the traditional wet markets, or they can choose to enter the new retail markets. If they choose to enter the new markets, then they must do as the new markets demand. This is not optional, and as I have indicated, you are either in or you're out. If you are not a preferred supplier, you are an out-supplier and if you are an out-supplier there is a risk that you will become increasingly marginalized. And that, of course, is the key concern, for the gaps between poor farm and rich farm, and rural and urban households are increasing.

Small producers can respond by seeking to minimize costs. Remember that in most instances, the majority of small producers with whom we are dealing are subsistence farmers using minimal inputs. The use of minimal inputs provides us with the ability to move the product quite readily towards more sustainable methods of production. Things like IPM are very, very conceivable in these limited input industries.

Small producers need to focus on what it is that the customers really want so that they can reduce wastage, and small producers need to leverage their competitive advantage. What is it that the small producers have? Economics textbooks talk about three things: land, labour, and capital. They haven't got capital, so the only things that they do have are land and labour. If they concentrate on more labour-intensive crops rather than broad scale agricultural crops, our small subsistence farmers have a competitive advantage.

Small producers can consolidate. I would suggest, in fact, that small producers must consolidate. Cooperatives are not a dirty word. In terms of supply chain management and the markets within which we now operate, we must cooperate, we must collaborate. It is the only way that we can ensure the survival of the small farmers. Through consolidation, small farmers are able to improve the reliability of supply. They are able to secure greater volumes. They are able to undertake production planning to ensure that there is a continuous and regular supply. They are able to improve quality through

having large enough volumes that they can grade the product, but collectively make the necessary investments in infrastructure and logistics to deliver what customers require. Small farmers can respond by differentiating. We can explore alternative ways of servicing our customers through cultivating desired proprietary varieties, through creating a product assortment, through prepacking, through precutting, through semi-prepared products, or through labelling, all of which add value for the customer. Our producer groups may seek to explore alternative market arrangements, or new market segments. We are seeing greater opportunities for producer groups to supply directly to customers, or even to consumers. In the developed countries, the Internet is becoming more widely used as a means of purchasing fresh fruit and vegetables. In the transitional economies, producer groups have the ability to deliver direct, door-to-door, to consumers.

Producer groups also have the ability to differentiate their product by branding. You can brand the product as organic, but you can also brand the product as hydroponic. We find that often the consumers' perceptions and the consumers' reality are quite different. But consumers can and consumers do differentiate between those chemicals that are applied to control pests and diseases and those that are applied to the soil or nutrient solution to facilitate growth. Producers can differentiate their product on the basis of sustainability, the concern for the environment, and the increasing concern among the more affluent consumers that farmers have been treated fairly and equitably and that their welfare has been adequately protected. Fair-trade labels are increasing rapidly throughout the industrialized countries.

### **What makes supply chains work?**

Clearly, if supply chains are to operate, there must be clear benefits for both partners. Farmers are going to look for high prices and a guaranteed market. Buyers are going to look for low prices and a reliable supply. Since many of the actors who are involved in the supply chain are both buyers and sellers, there is clearly a conflict. Conflict is inevitable. It's how we manage the conflict that is the interesting factor. To do that, we need to build enduring long-term relationships. We need to recognize that as we move towards supply chain management, the partners become increasingly interdependent. Our customers rely upon our suppliers. As the suppliers, we rely upon our customers. We are not interchangeable, because of the investments that we so often make. This is perhaps the greatest difference between business-to-business and business-to-consumer markets. In business-to-business markets, buyers do not readily switch suppliers. We lock in for long-term relationships, and clearly long-term relationships will only operate where there are compatible goals, where both partners are pursuing the same outcomes.

The key construct that continually emerges in building long-term relationships is trust. Trust is the knowledge that I have that my partner will do what I expect my partner to do. I know how they will react. I know how they will respond. I know that what they say they will do they will do and that provides me with an assurance. Trust is also about knowing that my customers will do what they say they are going to do in my best interest: that is, they will not take advantage of me. So, when we talk about trust, we need to talk about trust in terms of two key issues, credibility and benevolence.

Credibility is the knowledge that they will do what they say they are going to do, and benevolence, that they will do it with my best interests at heart.

Of course we need the commitment. Commitment is a state of mind: it's an attitude; a quantum shift where supply chain actors recognize the interdependence that exists between suppliers and their downstream customers. Commitment is also instrumental from the point of view that various investments are required in infrastructure and technology. It is also temporal. It involves a time element. Commitments are long term.

We need an appropriate means of governance. We need some way that we can work collaboratively and collectively to ensure that there is a more equitable sharing of the value that is created within the supply chain. We need to find a way and a means to be able to measure performance and to measure efficiencies so that when improvements are made those improvements are shared equitably among all the players in the supply chain.

Clearly, we need an open exchange of information. It is information that allows firms to adapt, and as we have seen already in terms of talking about preferred suppliers, it is the capacity and ability of suppliers to adapt to meet the needs of their downstream customers that leads them to become preferred suppliers. As I began the presentation, it's all about effective leadership. Somebody has to take control, and the various suppliers and the various actors need to acknowledge and to accept the right to control the supply chain.

DELEGATE: I want to ask Dr Peter Batt the difference between value chain management and supply chain management?

DR BATT: Traditionally, supply chain management has been production driven. We have looked at pushing product down the supply chain, whereas the value chain concept works the other way. It's a pull rather than a push. Here we look at the customer's requirements as being the driving factor. Hence, we use the term value chain rather than supply chain to recognize the customer orientation. I didn't use the term today because I was asked to talk on supply chain management. Differentiating between value chains and value nets all becomes rather academic. The key issue here is to appreciate and to understand that it's the customer who rules. The customer is king. In a global environment, customers have a lot of options. So, if we don't deliver, somebody else can and somebody else will.

DELEGATE: I would like to ask Dr Peter that if the customer becomes the major driving force for the farmer, under what situations will the farmer become king? I would like to ask Thai farmers to produce only enough for the family, only enough for the community, only enough for domestic consumption. I have no need to produce for export. I think in this situation, it may be the farmer who will be the king, because the city people have nothing to eat. I would like to get your idea about that.

DR BATT: I appreciate the question. I love a challenge. Taking your comments to the extreme, and perhaps there will be others later who will comment here as well, about a third of Europe's GDP is spent on the common agricultural policy. I would argue in

such a context as this, the farmer is already the king. Farmers are getting paid not to do anything and to take their land out of production to solve the very issue that you have described. By controlling supply, you can control the market. But as we operate today in a global environment, if you were to suggest that Thai farmers should hold back production, product will come in from somewhere else, because the higher prices will attract farmers in the People's Republic of China or Viet Nam or Malaysia. The higher prices will attract the competition and inevitably supply will exceed demand and prices will fall. We must also acknowledge that the only way farmers can respond to falling prices is to increase production again, and as production increases, prices fall still further and so farmers increase production still further. This is described as cobweb theory. Prices keep going down and down and production continues to increase.

DELEGATE: Dr Batt, in the beginning when you defined supply chain management, you emphasized that it needed somebody to take the lead, to coordinate, to control. At the end, one of the key success factors was effective leadership. I saw an invisible leader somewhere who is controlling. Does that mean government? Does that mean the traders and the producers or everybody?

DR BATT: I would sincerely hope that it is not the government – let the market rule – but I think what we are acknowledging here is that the market, where prices are determined by supply and demand, is no longer appropriate. It can't work in terms of being able to supply the consistency and the reliability that downstream customers require. I am talking here specifically about supermarkets and food manufacturing. The example that I so often use here is potatoes. We need to appreciate that certain types of potatoes are cultivated for fresh markets, others are cultivated for chips, and there are others that are cultivated for French fries. If we are going to produce these potatoes, we need to know who we are producing them for and what quality specifications they require. The invisible hand that is so often talked about in marketing texts is becoming more and more visible. It's the retailers, the category managers and the food processors who are determining the market requirements.

DELEGATE: Thanks very much, Peter. Last May, Peter and I were in Bali visiting a project. Just after we got back into the bus I bought three T-shirts from a lady for \$10. Peter bought 7 T-shirts from the same lady for \$10. Now, I don't know whether his purchases were an equitable sharing of value and I really got ripped off, or whether my purchases were an equitable sharing of value and he was really ripping off the seller. But, the point I want to make is that equity and inequity are subjective concepts. Could you elaborate on that a bit?

DR BATT: Another challenge. I agree equity is subjective. Regrettably, we must acknowledge that the farmer is at the bottom of the food chain. We can't change that. Farmers are always going to take what basically is left, but what we are starting to see is more responsible leadership. We will hear from speakers about the importance of fair trade and equity where there is greater transparency. Consumers are beginning to demand that farmers receive a certain proportion of the income or at least are perceived to, and as the value increases, they receive a fair share of that increased value. Equity is subjective and it depends upon what we perceive to be a fair and reasonable share. That

is going to become increasingly difficult to do as low cost producers effectively muddy the water.

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## **MARKET ANALYSES**



## **Alternative supply chain management practices and the performance of marketing channels in fresh fruit and vegetable marketing in Sri Lanka**

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### **Abstract**

*The purpose of this study is to investigate how alternative supply chain management practices adopted by leading supermarkets engaged in fresh fruit and vegetable marketing in Sri Lanka impact on the performance of the supply chain. We investigate on-going changes in the supply chain using information from leading supermarkets and related players. The information sheds light on how the new supply chain management policies and procedures have affected the cost structures, long-term profitability and organizational viability of the system. The emergence of supermarkets over the last decade or so has profoundly influenced Sri Lanka's fresh fruit and vegetable marketing system, and the trend is expected to continue into the foreseeable future. The efforts of profit-motivated supermarket giants to sustain a very competitive market have altered traditional production and marketing channels. Evidence suggests that the supermarkets are competing to adopt a range of management strategies to offer quality products, a wider choice, reduced wastage, greater value for money and shorter, but more effective supply chains. The impact of supermarkets on global and local supply chains, and its implications for actors in the supply chains has received much attention in recent years. This research study will utilize standard performance measures to compare performance of competing supply chains including: (i) satisfaction of stakeholders (supermarkets); (ii) price performance (profitability); (iii) labour employment; and, (iv) efficiency (price stability, timely delivery of orders, quality management). Information will be collected through a series of interviews with the appropriate personnel in the supermarkets concerned and their supply chain partners.*

### **Introduction**

Emergence of supermarkets and their explosive growth over the last 10–15 years has profoundly influenced Sri Lanka's fruit and vegetable marketing system, and the trend is expected to continue into the foreseeable future. Efforts made by supermarkets to thrive in a competitive market have altered traditional agricultural production and marketing channels. The supermarkets are competing to adopt a range of management strategies to offer superior quality products, a wider choice, reduced wastage, greater value for money and shorter and more effective supply chains.

The primary aim of this study is to investigate how the alternative supply chain management practices adopted by leading supermarkets for marketing fresh fruit and vegetables in Sri Lanka has impacted on the performance of the existing supply chain. The study was focused on information obtained from leading supermarket chains and other key players in the marketing system with a view to exploring how the emerging supply chain management policies have affected the operations and organizational viability of the marketing system. The paper focuses on changes in the supply side, mainly on the coordination and functioning of supply chain partners and how they have contributed to the effectiveness of the overall system. In more specific terms, the study seeks to:

- i. identify major changes emerging in Sri Lanka's fresh fruit and vegetable supply chain system with respect to its organizational and functional aspects;
- ii. establish to what extent the coordination of supply chains and its key partners have contributed to the transformations in the marketing system and their implications on the operational effectiveness;
- iii. identify key policy issues that require the attention of public policy makers for further improving the fresh fruit and vegetable marketing system.

The study is based on data gathered from key supply chain partners in the fresh fruit and vegetable marketing system. Data from supermarkets, mostly involving primary data gathered through interviews and case studies, and data from the traditional supply chains, mostly in the form of secondary data, is used. The dual approach allows researchers to gain a better understanding of the processes involved in the marketing system by combining information within the given context. The study seeks to establish the performance of emerging supply chains and their impact on price levels, cost compositions and functional efficiency.

The paper is organized as follows. The next section provides a brief background of the literature followed by an overview of fresh fruit and vegetable production and consumption patterns in Sri Lanka. Section Three focuses on an overview of the management practices adopted by the supply chain partners and their impact on the performance efficiency of the supply chain. Section Four provides a discussion on the relevant issues, and Section Five concludes the paper.

## **Background**

The impact of supermarkets on global and local supply chains and its implications for all actors in the supply chains has received much attention in recent years; e.g. Ghezan *et al.* (2006), Cadilhon *et al.* (2006), Neven and Reardon (2004). Cadilhon *et al.* (2006) use parallel performance measures that are evaluated using data collected through interviews and case studies. Chen *et al.* (2005) investigate the issue of modern agrifood systems organization and its effects on fresh fruit and vegetable farmers and traditional marketing systems in Asia. They observe that individual small farmers are unable to compete with larger counterparts. If they are to supply the supermarkets, they will have to work in groups. The paper suggests ways for small farmers to adapt to the situation, and for government to respond with changes in their policies. Shepherd (2006) also agrees with the need for government to recognize these trends, to identify ways to

support farmers, and to assist existing marketing systems to compete with the supermarket sector.

In Sri Lanka, fresh fruit and vegetable supply chains and their management is an area that has not been studied in detail. The information available is limited to more general market- and price-related details on a few specific fruit crops (HARTI, 2003). Other currently available sources of information on this subject are mostly based on secondary data sources (De Silva, 2006; Perera *et al.*, 2006). A study undertaken by Sinhapura (2004) using primary data from a smaller set of supermarkets in Colombo provides more detailed insights but is devoid of field level information.

### **Fruit and vegetable production and marketing system in Sri Lanka: an overview**

Sri Lanka has a total population of about 20 million, of whom nearly 70 percent live and work in rural areas. In 2005, agriculture contributed 17 percent of the GDP, down from 35 percent in 2000 (World Bank, 2006). Agriculture accounts for about a third of the country's labour force. Despite a relatively high per capita income of around US\$1 100, Sri Lanka shows a significant income disparity at the regional level highlighting marked rural and urban differences. The sector problems are compounded by the sluggish growth trend in agriculture over the last two decades – around 1.7 percent per annum – while the overall economy has been growing around 5 percent. In the last two decades, the population has shown a major rural-to-urban migration, notably to Colombo and its adjacent suburbs.

In terms of supply, the bulk of the fresh fruit and vegetables produced in the country are grown in the drier parts of Sri Lanka, which accounts for two-thirds of the country's physical land area. This area typically produces “lowland”, hot climate fruits and vegetables. Because of its seasonal rainfall, fresh fruit and vegetable production in the dry zone is highly seasonal. On the other hand, in the wet zone, due to a more reliable rainfall intensity and distribution, a wider range of fruit and vegetables are cultivated on a year round basis. The central hills of the country, with their milder climatic conditions, produce temperate vegetables, typically known as “upland” vegetables, throughout the year.

### **Key features in conventional fresh fruit and vegetable supply chains**

Wide seasonal fluctuations in production with a peak in January to March and a trough in May to June is a predominant feature of the supply chain for fresh fruit and vegetables in Sri Lanka. Inadequate storage facilities lead to surpluses during the harvest period and extreme shortages during the off-season. The system therefore exhibits wide seasonal price variation. This situation is more evident in the case of fruits. During the peak supply season, the fresh fruit and vegetable supply system typically records wastage of around 30 to 40 percent (HARTI, 2005).

Prior to the introduction of economic liberalization policies in 1980s, the fresh fruit and vegetable marketing system in Sri Lanka was dominated by state sector interventions including the operation of commodity marketing boards, purchasing mechanisms and other interventions. This period was typically characterized by: (i) high levels of

production and price risks faced by producers, (ii) the presence of multi-layered and long marketing chains, (iii) poor product quality at the retail end with little or no choice, and (iv) high price uncertainty for the consumer.

### **New partners in the emerging fresh fruit and vegetable supply chains**

With the adoption of economic liberalization policies in the 1980s, there have been significant changes in the fresh fruit and vegetable marketing system. Policy changes enabled private sector entrepreneurs and institutions to play an increasingly dominant role in improving supply chain management and the structure and performance of the fresh fruit and vegetable production and marketing system. The change was further supported by a number of factors including increasing per capita incomes, expanding urbanization, shifting food preferences and consumption patterns, and improved communication facilities. New supply chain partners have emerged including outgrowers, private sector extension workers, transport operators with refrigerated trucks and modern packaging systems, warehouse operators and integrators at the intermediary level, supermarkets, retail shops and exporters.

### **Outgrowers and village level assemblers**

The establishment of a formal outgrower system and collecting centres at the village level by supermarkets is a new phenomenon in Sri Lanka's agricultural marketing system. The system reflects a well-coordinated effort by private entrepreneurs to improve their supply chains and to ensure quality product and continuity of supply. Outgrowers are organized at the village level as informal producer associations. Evidence indicates that most of these groups are strong and cohesive with a high degree of accountability. Some of these associations have developed close linkages with the village level microfinance institutions (e.g. SANASA Bank network) to use short-term production credit facilities. Generally, a collector agent or facilitator is stationed in the village to coordinate supply, thereby providing the supermarkets with a cost-effective and financially sustainable strategy that enables the retailer to adopt a demand-responsive extension system. The system is effectively used to disseminate extension-related information between the supermarket and the producer to ensure product quality and to manage and plan supply levels.

### **Transporters with refrigerated trucks and non-conventional packaging**

Poor transportation and packaging is a major cause for the high wastage reported in Sri Lanka's fresh fruit and vegetable marketing system. As a consequence, most supermarkets have developed an alternative practice of using refrigerated trucks and plastic crates for packing. The new system has reduced wastage to around five percent. Under the conventional system, fruit and vegetables were packed in gunny bags and transported in ordinary lorries. The charge levied for the lorry was determined by the number of gunny bags transported and hence, the system automatically encouraged carriers to pack the maximum amount in a gunny bag and to accommodate the maximum number of gunny bags per lorry.

The improved transport system adopted by the supermarkets is estimated to be more than 50 percent more expensive than the conventional system, but the cost disadvantage is more than compensated by the improved product quality and higher overall prices. In

order to improve the situation further, some of the leading supermarkets are currently working closely with local plastic manufacturers to develop low-cost, more durable plastic crates.

### **Warehouse operators**

The operation of warehouses for fresh fruit and vegetables is a new activity emerging from the establishment of supermarkets. Most major supermarkets operate large warehouses, usually more than 2 000 square feet, in or around metropolitan city centres. Warehouse management plays a key role in the procurement process, mainly for sorting, grading, weighing and packing the product before the product is dispatched to the individual supermarkets. The warehouse provides a major source of employment for the unskilled workers.

### **Larger scale retail centres specializing in fresh fruit and vegetables**

The establishment of retail stores specializing in fresh fruit and vegetables only is another new feature in the fresh produce marketing system in Sri Lanka. These retail outlets generally handle larger volumes than the ordinary retail shops, but seldom handle more than 500 kg per day. They are usually managed by a single entrepreneur as small stalls, averaging about 500 square feet and employing about five to ten employees per stall. A larger chain of this type of retail shop currently employs a total of about 400 full-time employees.

### **Supermarkets**

The emergence of supermarkets as a partner in the supply chain is a recent phenomenon in the Sri Lankan economy. These supermarkets differ from other fruit and vegetable outlets in being large, self-service units with at least 1 000 square feet of floor space. They deal with a wide range of food and non-food items and offer greater choice to customers.

The wave of “supermarketization” in fresh produce marketing in Sri Lanka began in 1983. In subsequent years, the network of supermarkets increased progressively, triggering a major shift in the production and marketing system. Currently, there are about 170 supermarkets in a number of major cities in the country. Competition among them is intense.

### **Integrators**

These are corporate entities that are dedicated to providing a wide range of agriculture products and production-related inputs and services to fresh fruit and vegetable growers as a one-stop-shop. As a part of the range of services provided, the integrators are involved in production and retail marketing, particularly for processed and semi-processed forms. Among the other services provided by the integrators are local production of paddy, vegetable seeds and planting materials; the sale of agrochemicals and fertilizers; soil, plant and water analytical services; tissue culture and plant nurseries.

### **Exporters**

Fresh fruit and vegetable exports from Sri Lanka have been increasing over the years. In 2005, more than 14 million kg of vegetables and 7 million kg of fresh and dried fruits,

with a value of Rs1 115 million and Rs609 million respectively, were exported from Sri Lanka (Source: Export Development Board, Ministry of Trade, Colombo).

### **Supply chain management practices for fresh fruit and vegetables**

The evolution of supply chains associated with the marketing of fresh fruit and vegetables is a function of the changing demand and supply conditions in the market, along with many advances in transportation, storage and information technology. The many changes that have occurred over time can be generally attributed to the financial and operating efficiencies gained by the partners in these supply chains.

#### **Gains from the outgrower model**

The outgrower model of production provides a number of advantages for the grower including: (i) promise of a better price; (ii) ensuring a guaranteed market for the produce in advance; (iii) access to better technical know-how; (iv) adjustment of the cropping calendar to avoid oversupply; (v) access to financial assistance; and (vi) absence of trading intermediaries. In most instances, the contract growers enter into formal forward-sales contracts with the buyer at predetermined prices.

#### **Cost savings from shortened and more secure marketing chains**

Intervention by supermarkets has helped to reduce the length of the supply chain. The appointment of a field level representative to purchase vegetables from the grower at the collection points is the major strategy underlying the change. The vegetables collected at the village level collection centre are packed in reusable plastic crates and transported directly to the supermarket warehouse in Colombo by a transport operator using refrigerated vehicles. For cost efficiency, the supermarket outsources the transport. The process, although more expensive than the conventional system, reduces wastage, maintains quality and provides growers with a higher net farm gate price (Table 1).

**Table 1: Comparison of the distribution costs of vegetables as a percentage of the selling price in supermarkets and conventional retail shops**

	Percentage distribution of costs	
	Supermarket chain	Conventional marketing chain
	-----	-----
Farmgate price	42	27
Handling/transport/packing	29	15
Commission agents	-	15
Wastage	6	16
Retailers margin	23	27
	-----	-----
Selling Price	100	100

An investigation into the marketing costs for fresh vegetables in one of the leading supermarkets indicated that, for reasons of cost control, their warehouse operations are considered as a separate cost-centre in their management system. This constitutes a new approach under which the warehouse operates as a non-profit, no loss basis. The



procurement process is handled by the warehouse operators. The produce brought to the warehouse is graded and packed and sent to the supermarket for sale. The supermarket typically retains a sales margin of around 20–25 percent. The elimination of several intermediate layers in the traditional supply chain has enabled the supermarket to substantially reduce costs, the benefits of which are, in part, passed onto the producer.

#### **Reduction of post-harvest losses**

Reducing post-harvest losses is a critical factor in marketing fresh fruit and vegetables. In general, fruit shows higher level of post-harvest losses, mainly due to poor harvesting and post-harvest handling practices, while vegetables as a whole, show lower wastage. Most supermarkets have taken several steps to ensure quality and to improve the shelf life of fruit and vegetables. Some leading supermarkets have established teams of officers to provide advice to farmers on how to minimize post-harvest losses and to improve quality. Some of the major supermarkets have substantially reduced their losses by engaging in processing and value addition.

#### **Offering cheaper prices to the consumer and higher prices to the producer**

An analysis of the prices of vegetables sold in the supermarkets indicates that the retail prices are typically 10 to 15 percent lower than the retail prices in the conventional marketing chain. The lower price offered in the supermarkets can be attributed to the “high volume–low mark-up” strategy adopted by most supermarket chains. In the conventional marketing system, the retailers usually transact on the basis of “low volume–high mark-up”. The analysis also showed that retail prices among five supermarkets in the city of Colombo did not show a high degree of correlation (0.68) indicating independent pricing mechanisms. The correlation between the retail prices in the supermarkets and the retail prices in the conventional retail shops were even lower (0.56). Evidence also suggested that the contract growers supplying vegetables to the supermarkets consistently received prices that were 15–25 percent higher compared to the conventional marketing system.

#### **Efficiency gains from establishing village-level, private-sector agricultural extension workers**

Establishment of a new, private-sector driven extension system initiated by the supermarkets has streamlined many important segments of the supply chain. Typically, the persons operating the purchasing centres at the village level provide advice to their growers on how to produce higher quality fruit and vegetables and provide guidance on various ways of selecting, growing, harvesting and transporting to minimize losses and maintain quality.

#### **Benefits from countering seasonality**

The leading supermarket chains in Sri Lanka operate their outgrower systems in both the wet zone and dry zone geographic areas. This arrangement allows the supermarkets successfully to counter the seasonal availability of most fruit and vegetables.

Some supermarkets have even taken a step further and have supervisors and field officers who provide technical advice to the farmers about agronomic practices such as rescheduling of planting dates to overcome oversupply situations. The field-based officers also provide advice on accessibility to credit, fertilizers, and improved seeds and planting materials.

## Discussion

Supply chain management practices in the fresh fruit and vegetable sector in Sri Lanka have irreversibly impacted on the performance of marketing channels in a variety of ways. Our analysis shows that the new development has had a significant “pull” effect on fresh fruit and vegetable production at the national level. The change has facilitated the emergence of a more dynamic marketing system that is more responsive to the consumer needs. It has also enabled the introduction of contract farming and forward–purchase mechanisms at the producer level.

The change has led to a substantial increase in consumer satisfaction by providing them with more competitive prices, a wider choice of varieties, and improved product quality and presentation. The consumer-friendly nature of the supermarkets has led to a major increase in the number of consumers patronizing the modern outlets. This has led to the creation of new job opportunities in the form of processing and value-added activities. The six major supermarket chains currently employ about 4 700 people.

A negative effect of the process, however, is an undermining of the role of small vendors and hawkers. Even although it is argued that the two players, supermarkets and small vendors, serve two very different markets, it is likely that there will be a negative overall impact on the welfare of the small-scale traders.

For efficiency reasons, the outgrower system of purchasing fruit and vegetables appears to favour a smaller number of larger producers at the village level who are capable of supplying the necessary quantities and quality. This excludes many small-scale farmers in the village from participating in the supermarket supply chain, depriving them of a livelihood.

A fair and equitable distribution of benefits from the transformed supply channels to all potential participants calls for a better understanding of the economic and social dynamics of the changing supply chains. Managers and policy makers are expected to develop strategies that could ensure economic growth in the sector while the social benefits are maintained at the highest possible level. Some of the key areas for the policy makers to consider are:

- i. provide infrastructure facilities or public utilities to enhance efficiency;
- ii. improve access to financial facilities at the village level to encourage greater participation in production;
- iii. improve extension services to provide information to growers so that they are fully aware of the opportunities as well as the most efficient techniques of production, crop establishment and management, transportation and storage;
- iv. provide an enabling environment for small farmers to group together so that they can avail some of the economies of scale that larger farmers have when dealing with agents of the supermarkets.

Efficient supply chains in the fresh fruit and vegetable sector have strong implications for the economic and social welfare of the consumers who patronize supermarkets in

urban areas, the primary producers in the villages, and others who form the chain. Recognizing the fact that the private sector is a powerful force in the market, policy makers have the supreme responsibility of balancing the roles of the public and private sector.

### Summary and conclusion

This study focuses on alternative supply chain coordination practices adopted by leading supermarkets in the fresh produce industry in Sri Lanka, and how these practices impact on the performance of the supply channel. The paper places special emphasis on innovative practices adopted by different participants and determines how these practices impact on the performance of market channels, particularly in terms of economic and operating efficiencies.

The explosive growth of supermarkets in Sri Lanka has profoundly influenced the fresh fruit and vegetable marketing system, and the trend is expected to continue into the future. Continuing efforts by the supermarket chains to maintain their position in a very competitive market has altered the traditional production and marketing channels in Sri Lanka. The study indicates that the influence of the supermarkets has brought about major improvements in the quality of fruit and vegetables. The study suggests that the supermarkets are adopting a range of management strategies such as the establishment of outgrowers, reduction in waste, and improved transportation and storage, to offer superior quality produce to consumers, to give them a wider choice, uninterrupted supply and greater value for money. Efficient management of supply chains and closer coordination from the farmgate to the consumer will have a strong influence on the future welfare of the consumer and everyone else involved in the fresh produce industry in Sri Lanka.

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## **Key strategies for horticultural industries to remain internationally competitive**

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### **Abstract**

*With the exception of some tropical fruits, the world production of fruit and vegetables is slowing. Exports from developed and even some developing countries are also being threatened by increasing competition from low labour-cost countries. The consumer demand for more processed products also favours imports from lower-cost producers such as the People's Republic of China, thus increasing their international competitiveness. Processed and semi-processed products are less affected by quarantine barriers in importing countries. As the world trade in fresh produce comes under the increasing control of the major supermarket chains and global distribution companies, a strategic analysis of a nation's competitive advantages will become an essential precursor to implementing and maintaining globally competitive supply chains. One of the most important sources of competitive advantage is the ability to supply the chains all year round with safe, high-quality product lines. For seasonal fruit, this has meant a shift to producing and supplying product from both the northern and southern hemispheres. To remain commercially viable, farmers in the developed and developing countries will be required to implement new supply chain management strategies. These may include: increasing productivity and the economies of scale; moving to more collaborative packing and marketing systems; forming northern and southern hemisphere alliances; and controlling Plant Breeder's Rights (PBR) and associated Intellectual Property (IP). Governments can assist farmers to remain competitive by increasing research and development spending; creating seamless logistics or transport systems; improving export capability by setting up physical and virtual export hubs; and by providing tax incentives for exports and promotion. Farmers also play a key role in this process by working collaboratively, not only regionally, but also throughout the whole global supply chain. This process will be driven and facilitated by E-commerce systems.*

### **Global fresh fruit and vegetable consumption**

With the exception of some tropical fruits, the production and consumption of fruit and vegetables in developed countries is leveling off (George *et al.*, 2006), despite significant promotional programmes within country and despite improvements in product quality. This trend is due to a number of factors including: overconsumption of food in general, competition from other snack foods, and substitution of fruit and vegetables with vitamins, pharmaceuticals and other nutraceuticals. Australian Bureau of Statistics, USDA and FAOSTAT figures show that consumption of fresh fruit and vegetables is steady or increasing very slowly. In addition, fruit quality and price are

often poorly related due to many factors (Owen *et al.*, 2000; George *et al.*, 2005), so farmers may not be rewarded for their efforts.

A major cause for the lack of increased consumption of fruit and vegetables is the overwhelming variety of food products available to the consumer: in the 1960s there were about 600 food lines on retail shelves, today there are more than 12 000 (Stanton, pers. comm. 2002). In addition, the promotional dollars spent on advertising fruit and vegetables is too small to be effective, with less than 2 percent of the total advertising dollars spent on food lines (Cohen, 2002; Stanton, pers. comm. 2002). Increasing global obesity levels have occurred in spite of significant investment by health agencies and governments to promote the health benefits of fruit and vegetables through “5-a-day” campaigns. This is important because most industries prioritize domestic market promotion as their first strategy to increase consumption and subsequently stimulate production and prices. We suggest that promoting individual lines displaces other competing lines or substitutes for a short period, but has no long-lasting effects. Fruit also fits into a mundane, non-sexy product category, which is of variable quality and for which consumers lack confidence (Owen *et al.*, 2000). This makes fresh produce more difficult to promote compared with other “snack foods”. In 2004, there were about 30 fresh fruit snack lines compared with 1 700 processed snack foods in the average supermarket (Stanton, pers. comm. 2002). Farmers also believe that new varieties will increase their profits. However, the introduction of new varieties into the market has only a short-term benefit (George *et al.*, 2004), because the price–volume relationships for horticultural products are highly inelastic, and prices drop very quickly as increasing volumes are placed onto the market (George *et al.*, 2005).

### **World horticultural trade**

Exports from developed and even some developing countries are being threatened by increasing competition from low labour-cost countries (George *et al.*, 2004; 2005; 2006). Within the developed countries, there has been a shift towards the consumption of more processed food products (Robbins, 2005). Because processed and semi-processed products are less affected by quarantine barriers in importing countries, this shift favours imports from lower-cost producers such as the People’s Republic of China, thus increasing their international competitiveness.

The world trade in horticultural products is coming under increasing control by the major supermarket chains and global distribution companies who are demanding an assured all-year-round supply of good-quality, safe product (George *et al.*, 2004; 2005; 2006). Oversupply has also led to a shift in power in the supply chain moving it from a “push” to a “pull” process, where the supermarket chain and the consumer have increasing discretionary choice in terms of suppliers.

### **The importance of strategic analysis**

Strategies to maintain and enhance competitive advantage by industries have been well defined by Porter (1980; 1990; 2001). Porter (1980) suggests that there are three winning competitive positioning strategies, which are cost leadership, differentiation and focus, and that nations possess factor endowments which give them a comparative

advantage. Whilst most horticultural farmers are trying to implement Porter's winning strategies, horticultural supply chains have specific characteristics that are notoriously difficult for horticultural farmers to control or influence. These factors include: 1) poor relative power of many, small horticultural farmers within supply chains dominated by the large multinational supermarket chains; 2) reluctance of farmers to change varieties that are better accepted by consumers; 3) poor information transfer and awareness about competitors; 4) high perishability of fruit and vegetables often makes farmers price-takers rather than price-setters; 5) oversupply and market saturation and associated low farmgate price.

More recently, due to the greater dominance of supermarkets in global supply chains, one of the most important sources of competitive advantage that has emerged has been the ability to supply the chains all-year-round with safe, high-quality product lines (Cook, 2005). For seasonal fruit, this has meant a shift to producing and supplying product from both northern and southern hemisphere alliances.

In conclusion, farmers will need to use all of the above competitive strategies as defined by Porter (1980; 1990; 2001) and this strategic analysis, to identify competitive advantage, will be an essential precursor to implementing and maintaining globally competitive horticultural supply chains.

George *et al.* (2004; 2005; 2006) have described in some detail the key elements of the strategic analysis process for horticultural industries.

### **Research and development priorities**

Research and development (R&D) priorities must be based on strategic analyses which critically evaluate global competitiveness and supply chain performance. Hofman and Ledger (2006) suggest that R&D be linked to removing the most limiting factors in the supply chain. For example, in countries where domestic consumption has plateaued and export is difficult, farmers must reduce costs and increase productivity. Consequently, research should be directed towards improving these aspects. Alternatively, where significant export market windows exist, then R&D efforts should be directed towards selecting varieties suitable for the export market, improving transit and storage life and implementing efficient logistics systems. A list of possible production and marketing scenarios and R&D solutions is presented in Table 1.

**Table 1: Production, consumption and marketing scenarios for horticultural products and their potential impact on R&D and marketing priorities**

Status of domestic fruit consumption	Availability of export markets	Import risk	Research, development and extension priorities	Marketing priority
Static consumption, domestic market saturated	Difficult due to competition	Low	Increase farm productivity, reduce farm costs, consolidate farms to achieve economies of scale	Increase domestic market consumption through generic health promotion and education
Static consumption, domestic market saturated	Difficult due to competition	High. No sanitary and phyto-sanitary reasons for exclusion	Diversify production, select crops with competitive advantage, identify PBR varieties with superior quality to imported varieties	Promote own country product Market PBR varieties to obtain premium price
Static consumption, domestic market saturated	Good prospects, little competition e.g. counter-seasonal or exclusive PBR of varieties	Low	Select varieties for export markets, develop virtual and real export hubs and systems, develop low-cost seafreight systems and disinfection protocols	Identify and market to fill consumer needs in export country Promote product in export country
Good prospects to increase domestic consumption	Good prospects, little competition, e.g. counter-seasonal	Low	Prioritize above strategies to achieve maximum short and long-term profits	Prioritize above strategies to achieve maximum short and long-term profits, monitor potential competition

### Key strategies to increase global competitiveness

Some key strategies are presented below that may ensure a sustainable future for horticultural industries in both developed and developing countries. We have selected these strategies based on analyses of interviews, presentations and reports by leading horticultural producers and exporters from countries such as New Zealand (e.g. Zespri) and Chile (e.g. Chilean Exporters Association) (Brown, 2005; Martin and Luxton, 2005). We have verified our findings through an analysis of statistical data on fruit and vegetable production, consumption and exports for different countries (FAOSTAT, Australian Bureau of Statistics and USDA databases) and through an examination of audited company financial reports. We also elaborate on many of the strategies previously described by George *et al.* (2004; 2005; 2006).

The context in which these strategies can be used either at the national, industry or farmer levels is presented in parenthesis after each strategy. We suggest that all strategies, whether they are focused at the national, industry or farm levels are inevitably interconnected and that the objective is to increase awareness of their importance at all levels.

#### **Strategy 1: Strategic analyses** (national, industry and farm levels)

We suggest that for small farmers to remain viable in an increasingly competitive global market, it will be necessary for them to undertake stringent strategic analyses before even contemplating entering a new supply chain and that, for existing supply chains, structural changes may be needed to maintain profit share (George *et al.*, 2006). We



suggest that the strategic analysis process fits above the current “within house” supply chain planning processes. In the future, working “on the supply chain” will become equally, if not more important, than working “in the supply chain”. We also suggest that the strategic analysis process is too complex to be undertaken by individual farmers and that it should be conducted in collaboration with professional strategic analysts and marketers. George *et al.* (2006) have previously presented some of the key steps involved in the strategic analysis process. These analyses should be based on real time market intelligence due to the rapidity at which changes are occurring in global markets.

**Strategy 2: Increased R&D funding** (national and industry levels)

To maintain the competitive edge, it will be essential to stimulate both government and business investment in R&D in horticulture. In 2002, the percentage R&D per GDP varied from 0.3 percent for sub-Saharan states to 4.9 percent for Israel (UNESCO, 2005). For the United States of America, only 1.6 percent of the R&D budget was spent on agriculture. In recent years, there has been a significant increase in expenditure on research in the People’s Republic of China and other Asian countries, but a declining level of expenditure in many western countries. The government contribution to R&D has been decreasing steadily in many developed countries. Science is becoming increasingly dependent on international collaboration and off-shoring and outsourcing of R&D will become more common.

**Strategy 3: Collective promotion and education** (national and industry levels)

To increase significantly fruit consumption in the developed countries, where levels of consumption are currently amongst the highest in the world, we suggest that all fruit and vegetable industries will need to pool their promotional dollars. These programmes should be aimed at young children, teenagers and “baby boomers”. However, despite significant television advertising, through “5-a-day” campaigns there is little evidence to show that these campaigns are working. More recently, there has been a shift to implementing educational programmes in schools to alter eating behaviours of young children (Buzby *et al.*, 2004). These programmes appear to be having greater success. In Europe, a whole supply chain approach is being used to increase fruit consumption (Timmermans, 2006). If domestic market consumption cannot be increased in developed countries, an alternative strategy for continued growth is through expanding exports.

**Strategy 4: Export** (national, industry and farm levels)

Many countries have an excellent opportunity to capture counter-seasonal export markets. According to the Chinese Academy of Social Sciences (China View, 2004), the People’s Republic of China now has over 200 million middle-class people, with this number expected to double in the next ten years. This group will have sufficient income (US\$10 000 per year) to purchase high quality fruit and vegetable imports (George, unpublished data). Timing and product selection must be optimized.

Substrategies are to:

- re-engineer the whole export supply chain;
- set up real time market intelligence systems;
- set up seamless logistics or transport systems;

- set up physical and virtual export hubs;
- facilitate activities by E-commerce systems;
- move to low-cost seafreight systems;
- increase storage life and fruit quality.

**Strategy 5: Selecting export market “winners”** (national, industry and farm levels)

Only selected fruit and vegetable industries will remain viable and competitive in an open global market. Particularly threatened will be commodities that can be processed, produced or stored all year round such as bananas, apple and pineapple, and vegetables such as potatoes, carrots and garlic. Successful fruit and vegetable industries will need to market products matching the most important competitive advantages such as:

- having a global niche, off-season or counter-seasonality to lower-price competitors;
- significantly differentiating one’s product from competitors – ideally production and marketing can be controlled;
- having a short (less than three months), but sufficient storage life to ensure that the commodity can be seafreighted while remaining counter-seasonal;
- having a product that suits consumers’ palate in the target countries;
- requiring a higher level of technology or grower skill to produce.

**Strategy 6: Setting up global- and regional-based marketing companies** (national and industry levels)

To achieve economies of scale in marketing, farmers must market their produce together (horizontal integration) so as to control supply and to develop an internationally recognized brand name (Verheijen and Heijbroek, 1994). In addition, farmers will need to form strategic alliances with processors and retailers and focus their activities to supply safe, quality-assured, high-quality product. This process will be driven and facilitated by E-commerce systems.

Based on current production levels, Australia can only sustain three globally competitive, regional marketing companies. These export companies need to be of similar capacity to Capespan International in South Africa, Carmel in Israel, Dole, Del Monte and Chiquita in Chile. Each of these companies is exporting and distributing worldwide over 100 million tray equivalents per annum. In Australia, we currently have over 180 companies or farmers exporting fruit, with most exporting less than 20 000 trays. This is far too many actors to be successful.

Ideally, these global marketing companies should be farmer-owned and employ their own professional marketers (vertical integration). This eliminates the problem of unprofessional merchants or agents and sourcing of poor-quality fruit from the market floor for export, which severely damages Australia’s export reputation. Ideally, these global companies need to market through a single desk with a single brand. Characteristics of such a company would be:

- employing professional marketers;
- enforcing quality standards;

- employing on-farm best practice consultants;
- achieving economies of scale.

Many horticultural farmers have been reluctant to market cooperatively for many reasons including:

- lack of trust and transparency between farmers and regions;
- factional infighting within many existing farmer commodity associations;
- the tyranny of distance between regions;
- lack of familiarity with single desk marketing;
- lack of effective industry leadership;
- lack of entrepreneurial ability;
- lack of education;
- aging farmer population and lack of willingness to change.

These social issues need to be addressed if horticultural industries in developed countries are to remain viable. Similarly, horticultural farmers in developing countries have also been reluctant to market cooperatively. They have based their success on low costs of production, but increasing production and competition is starting to erode this advantage.

Farmers must also play a key role in this process by working collaboratively, not only regionally, but also throughout the global supply chain. This process will be driven and facilitated by E-commerce systems. An example of a successful global company is Zespri Ltd which markets close to AU\$1 billion of kiwifruit globally. It licences growers in both the northern and southern hemisphere to grow and market its selected varieties through a single desk system. It retains marketing rights for its varieties.

**Strategy 7: Setting up global closed loop marketing systems** (national and industry levels)

To obtain a durable, competitive advantage, new varieties and unique germplasms need to be grown and marketed globally under licence. Farmer-owned marketing companies should aim to form northern and southern hemisphere alliances to manage production and marketing all year round.

Sub-strategies include:

- moving to more collaborative packing and marketing systems;
- forming northern and southern hemisphere alliances;
- controlling germplasms through Plant Breeders' Rights (PBR) and associated Intellectual Property (IP);
- licensing not only the germplasm, but also the global marketing rights.

**Strategy 8: Disintermediation or shortening the supply chain** (industry and farm levels)

Under a single desk system, farmer-owned companies can employ their own professional marketer(s) who could be paid a base salary plus bonuses based on the

number of trays exported, and not on a commission basis as is customary with farmers selling their produce via merchants or agents. These global companies could also deal directly with the supermarket chains, thus eliminating commissions paid to market intermediaries and, at the same time, reducing transactional costs. We estimate that about 15 to 20 percent of the costs in the supply chain could be eliminated by this strategy. Disintermediation will be driven and facilitated by E-commerce systems.

**Strategy 9: Government incentives** (national level)

There are many areas where governments can assist farmers to establish viable supply chains without resorting to direct farm subsidies. Some of these are listed below:

- provide real time market intelligence e.g. USDA FAS service;
- fund export promotion;
- fund the establish of export hubs;
- reduce freight or logistic costs;
- facilitate freight coordination;
- provide tax incentives for exporters;
- facilitate clustering, amalgamations and alliances;
- provide low interest rate loans to establish or subsidize the amalgamation of regional packing houses;
- organize grower delegations to other countries to view systems;
- facilitate the use of single brands;
- facilitate market access;
- provide product insurance.

A summary of the key strategies and the role of farmers, marketers and government facilitating their implementation are presented in Table 2.

Market analyses

**Table 2: Relative importance of the role of farmer, marketing and government sectors in implementing key strategies**

Strategy	Sector			Key points
	Farmer	Marketing	Government	
Strategic analyses	***	***	***	This process needs to be conducted by all members of the supply chain but particularly by marketing and holistic system specialists
Increase R&D	***	***	***	Need for greater funding from the private sector to fund R&D. Significant R&D needed to maintain competitive advantage
Collective promotion and education	*	*	***	Educate children on health benefits of fruit and vegetables. Government intervention is needed to reduce obesity
Export	***	***	***	Setting up logistics and virtual and export hubs; this process needs to be conducted by all members of the supply chain
Selecting export market winners	***	***	***	Need for excellent strategic analyses and real time market intelligence. Difficult for the farmer to achieve this alone
Setting up global- and regional-based marketing companies	***	***	*	Must be driven by industry leaders and champions. Move to single desk marketing requires trust and transparency
Setting up global closed loop marketing systems	***	***	*	Requires significant organization and coordination. Licensing of varieties and marketing essential
Disintermediation or shortening the supply chain	*	***	*	Requires significant organization and coordination and real time E-commerce and communication systems
Government incentives			***	Many strategies that governments can use to assist farmers maintain competitive advantage

\* low involvement, \*\* moderate involvement, \*\*\* high level involvement

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## **Auctions: a proposed framework for research**

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### **Abstract**

*In much of the agricultural marketing world, the wholesale auction, in particular the low-volume fresh produce auction, has been supplanted by selling mechanisms deemed more efficient. However, in contexts such as Pennsylvania, in the United States of America, low-volume wholesale auctions for fresh produce have persisted. Like farmer-to-consumer farmers' markets, once thought to be "old-fashioned", these auctions are proving their continued usefulness in the modern marketing system for fresh produce. Other contexts have likewise witnessed the introduction of low-volume wholesale auctions as a means of marketing and of price determination, among them the rubber sector of southern Thailand, historically dominated by a small number of large corporate concerns and affiliate marketing networks. Rubber auctions in the south of Thailand appear to have challenged these networks and thus brought benefit to smallholders and to the region's rubber sector. The putative success of auctions as a sales mechanism in Pennsylvania and Thailand raises important questions relating to the efficiency of low-volume wholesale agricultural auctions and to the possibility of promoting such auctions for the benefit of small-scale producers elsewhere. This research note presents a preliminary report on work in progress comparing Pennsylvanian low-volume vegetable auctions and Thai low-volume rubber auctions. We outline a few of the many research questions that have emerged during the investigation of these case studies. Findings to date suggest that the subject is more complex than initial observations suggest and that the initial objectives of the research were too narrowly focused. In order to explain the usefulness of auctions in the modern agriculture marketing system and their benefits to small-scale farmers, the small-volume auctions we are examining will probably need first to be placed within the larger context of value networks and marketing channels. Second, the importance of low-volume auctions will change, we suspect, as the products being considered, undergo commoditization. Third, location effects might prove to be critical in the success of auctions. Nonetheless, we believe that the benefits to farmers commonly ascribed to small-volume auctions are likely to be confirmed, although not necessarily for the reasons that are currently presented in anecdotal reports.*

### **What is an auction?**

An auction is a way of selling goods and services characterized by a time-limited bidding system. The item is sold at the highest amount offered by buyers in a competitive bid, rather than at a price set by the seller in advance. The largest and



perhaps best known auctions today are conducted on the Internet by intermediaries such as eBay. However, the auction as an institution had its beginning far back in history. There are a number of different ways to structure an auction, each of which is said to offer advantages.

Auctions are the preferred sales mechanism to use when an item is rare in the market or when the true commercial value of an item is not known, such as in the case of rare books, original paintings or radio frequencies. Auctions are thought to offer the best opportunity for maximizing returns to buyer and seller because, as the theory suggests, the industry as a whole knows more about the value of an item than does any individual buyer or seller. Auctions are considered to be the fastest way to sell multiple batches of non-uniform items and items with variable price and variable quality characteristics, when the items are perishable, and when the buyers are influenced by idiosyncratic perceptions of value.

Auctions are thought to offer several other efficiencies, among them diverse kinds of information exchange. At an auction many buyers and sellers come together at the same place rather than meeting one-on-one. The auction process sharpens competition (in the absence of collusion among buyers or sellers). Widening circles of acquaintance among buyers and sellers can lead to other kinds of business interactions. Side-by-side quality comparisons in an auction may help reduce price and quality uncertainties. Auction gatherings also lend themselves to the sharing of technological and demand information.

The growth of on-line auctions and the spectacularly successful auctions of government bandwidth assets in the recent past suggest that auctions offer benefits to sellers and buyers that are not found with other sales mechanisms (McMillan, 2002). Some of the research on modern auctions focuses on the sources of these benefits.

### **Research on auctions**

Auctions are studied academically primarily as subdisciplines of game theory and information management science. Imaginary auctions are used extensively as a research tool in advertising science.

Game theory involves the mathematical analysis of the way competitors interact. Information management research studies the way behaviour changes when the amount of information available to each participant is different, or when the item offered holds different subjective or practical value for one participant than for another. Advertising research uses imaginary auctions with sample consumers to estimate the relative value of one product characteristic over another, asking, for example: "How much more is a car with leather seats worth than one without?"

The formal study of game theory began in the early 20th century but did not come into its own till post-World War Two when it was used to formulate Cold War strategies. John Nash's 1994 Nobel Prize for Economics<sup>2</sup> was for his work on the mathematics of

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<sup>2</sup> The Bank of Sweden Prize in Economic Sciences.

game theory. The 1996 award went to William Vickrey for his mathematical analysis directly on auctions mechanisms, one of which is now called a Vickrey auction. Vickrey and others have done considerable work on bid maximization under various auction structures. Some of the best recent theoretical work on auctions has been done by Milgom (1999; 1989; with Weber 1982), McAfee (with McMillan, 1996; 1993), Weber (with Milgom, 1982), and McMillan (2002). Comprehensive, non-mathematical descriptions of auctions can be found in the writings of Klemperer (2004).

Unfortunately, it appears that almost no recent scholarly work has addressed agricultural auctions and the role they might play in increasing profits for certain groups of farmers. The recent mergers of auction houses in the Netherlands and the expansion of auctions from Pennsylvania to other locations in the USA has generated some descriptive work but seemingly no work on the mathematical or theoretical approaches.

No matter how quickly auctions have proliferated in the modern world, agricultural auctions remain rather out of fashion. It is generally felt, based, it seems, on very weak evidence, that auctions are less efficient sales mechanisms for agricultural products than other mechanisms, in particular contract sales. Some forecasters even suggest that the Dutch flower auctions, which today move many millions of tonnes of flowers and nursery crops per year, will soon be supplanted by increasingly more effective web-based marketing systems that allow virtually instantaneous trade across international borders.

Two examples of agricultural auctions today seem to be exceptions to the above generalization. These are the small-volume fresh produce markets in the United States of America (Pennsylvania in particular) and local, small-volume rubber auctions in Thailand. The reported usefulness of auctions in obtaining good prices to farmers in these two contexts forms the basis for our research.

### **Pennsylvania produce auctions**

Small-volume produce and livestock auctions were common in Europe and North America until shortly after World War Two when an improvement in transportation and communication transformed wholesale marketing systems for fresh produce. As local food systems came increasingly to rely on supplies shipped from distant production sites, the need for localized production and sales decreased. Regional auctions in horticultural production areas initially grew as products became commoditized<sup>3</sup> but auctions were later phased out as farm consolidation led to markedly increased production capacity and contract production became more popular. Reliable historical information on the location and characteristics of auctions in North America and elsewhere has not been collected (Tourte and Gaskell, 2004; Brown, 2001) but, by the end of the twentieth century, only a handful of small volume auctions remained active in the United States of America, several of them in Pennsylvania. Today, there are about 11 fresh produce auctions active in Pennsylvania, clustered in the southeast and south central regions. There is, to our knowledge, no current count of the small-volume

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<sup>3</sup> “Commoditization” refers to the process by which a product evolves from one that is somehow special in the market place into one which is little different from similar offerings and is sold on the basis of price alone.

auctions operating today in the United States of America or elsewhere, nor are there empirical studies of their economic benefits. It is known, however, that new auctions of this type have recently sprung up, generally initiated by groups of farmers supported by local agricultural extension officers acting on reports about successful auctions in other communities. Financing for these ventures may be offered by local government.

The persistence of small volume produce auctions in the United States of America is commonly attributed to the coherence of their membership base, a topic to which we will return later in this paper. The auctions are generally reported to be organized for the benefit of growers, not buyers<sup>4</sup>, while aiming toward fair prices for all. Although there is no formal literature on the subject, conventional wisdom among auction organizers is that the farmers who benefit from these auctions, in those locations where they are available, are likely to be:

1. farmers who cannot participate in the wholesale marketing system for technical reasons such as small volume of production, lack of a ready market for the niche products the farmer prefers to grow, or a poor farm location relative to market collection points;
2. farmers who choose not to participate in the wholesale marketing system;
3. farmers who spread risk by using numerous market channels;
4. farmers who produce too much to sell by direct market methods;
5. farmers who do not enjoy direct marketing;
6. farmers with a temporary glut and convenient access to an auction.

We believe that it is important to note that the Pennsylvania auctions exist in relatively densely populated regions with a wide range of marketing channels which farmers might also use.

### **Thai rubber auctions**

Since its integration into the commodity trade centred on the North Atlantic in the mid-nineteenth century, Thailand has had a classic market-led economy. The rapid emergence of Thailand as a major exporter, most famously of rice, but also of rubber, teak and tin, came on the basis of the integration of national trading networks into a liberal international economic order. The almost exclusive role of smallholders in Thailand's rice and rubber economies and the comprehensiveness of Thai integration into the worldwide market systems highlight the way that prices determined on world markets shape the evolution of local agriculture. That is, world market signals are as important in Thai national markets as they are in the country's international trade. These prices serve as the primary determinant of the allocation of scarce factors of production, in particular rural labour, among alternatives.

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<sup>4</sup> While it is understood that buyers and sellers must both benefit from any transaction, market places can be characterized by whether their structures favour one over the other. Auctions, because they are thought to maximize the price received for an item are generally said to benefit sellers. In the sociopolitical context of small-volume produce auctions in the eastern United States of America, the auction's benefits to supposedly disadvantaged smallholder farmers are often stressed in public reports.

Thai smallholder rubber is linked to international markets through a highly developed, efficient system of international price determination and purchasing, centred historically on Singapore and dominated by members of the Hokkien Chinese speech-group. Historically, auctions did indeed lie at the core of the Hokkien rubber marketing system. In London, New York, and above all at dock-side in Singapore, auctions for Southeast Asian smallholder rubber determined prices across Singapore's transnational rubber-producing hinterland, including southern Thailand. Before the establishment of branches of Singaporean and Malayan firms in the early post-1945 period, local smokehouse operators and exporters monitored radio broadcasts of rubber prices. Local managers of these firms and the lower-order buyers that connected them with rural producers were well-informed of price fluctuations on the international, and thus the local rubber market. In abstract terms, all participants in the Thai rubber economy were price takers based on benchmark prices determined elsewhere.

Thus, the sort of price uncertainty that typically explains recourse to auctions did not appear. In addition, it is an open question whether the volume of rubber traded in Thailand as a proportion of the total international trade would have given the local market enough power to influence price determination outside the international benchmarks.

These realities understood, how then do we account for the recent initiation of auctions for smallholder rubber in Thailand? Quantitative data on the Thai rubber sector is notoriously difficult to obtain. As yet, we have been unable to gain much headway in our investigation of the reasons why small-volume auctions are so highly considered. In particular, the analysis of price trends across market locations is incomplete.

### **Research questions**

Our research begins with the observation that small volume auctions of rubber in Thailand and of fresh produce in the USA are increasing in number and are praised for their ability to get high prices for farmers. Our hypothesis is that in some circumstances, auctions represent a more advantageous sales mechanism for small- and medium-scale farmers than other options to which they have access. This hypothesis leads to a number of research questions beginning with the fundamental question of whether the observations and case studies that are presented in the (mostly) popular press are really true or if auction observers are misinterpreting what they see. What evidence of higher returns from auction sales exist? Are there real time savings in auction selling? If not, how did the idea that they are better for farmers arise?

If auctions can be shown to offer benefits for some farmers and that these benefits are superior to other available options, then we must ask what theoretical and practical advantages are demonstrated by these auctions? Do American and Thai auctions use the same mechanisms? What benefits do these growers get from auctions that they do not get from other market mechanisms? What are the factors that determine success in the auction setting? Is the primary benefit economic (higher returns on investment) or social (better business connections, market information, and the like)? To what extent is farm location a factor in the success of auctions?

What lessons can be learned from auctions in Thailand and America? Can auctions be promoted as development tools to improve profitability for farmers in a wide range of situations in developed and less-developing economies? If so, when and how do you introduce small-volume commodity auctions for commodities and niche products in contexts where there is not much local experience with auctions? What institutional structures are required for auctions to succeed?

### **Progress to date**

Our research is only in the very early stages, but we can offer some findings, unfortunately based mostly on anecdotal evidence.

Our initial scrutiny of the two scenarios identifies several similarities and differences between the case studies that complicate the research methodology. The most obvious difference is that fresh produce is perishable while rubber is not. Thus the speed of auctions offers advantages for vegetable growers that perhaps are not as important for rubber growers.

Another difference, which was mentioned earlier in this paper, is that rubber is commoditized. Horticultural products of the kind that flow through the Pennsylvania auctions are not. This, in turn, leads to what may prove to be the most difficult issue to incorporate into the analysis; the fact that buyers of fresh produce in Pennsylvania auctions represent a different class of buyer than Thai rubber buyers.

A third issue which must be explored is the notion commonly put forward in the United States of America, that auctions are successful because the organizing committee is socially cohesive. While good management is certainly important in any business, is an unusually strong bond between auction organizers actually important to the successful realization of profits? This, on the face of it, seems unlikely. There are also nuances in the auction setting that are linked to farm size and auction volumes which may prove to be important in the final analysis.

### **Findings**

Based on the information gathered to date, we believe that the market mechanisms of auctions in the two scenarios will be different, perhaps so different as to derail the research project altogether. Our reasoning is as follows:

Thai rubber auctions are clearly traditional agricultural wholesale markets that function to consolidate supplies in rural areas where other marketing options are unavailable or are too time-consuming to access. Buyers, sellers and institutions represented at these auctions are not segmented. Quality criteria are standardized and adherence to this standard largely determines a price consistent with fluctuations in the world market. The Thai auctions most likely offer a time saving mechanism to buyers and sellers, which, although important to profitability, is not the same as a higher net price.

Pennsylvanian horticultural auctions are very different. The most obvious difference is that Pennsylvanian auctions are characterized by a greater diversity of buyers, sellers and institutions. Buyers at Pennsylvanian small-volume produce auctions can generally

be characterized as businesses that deal directly with the final consumer. These buyers hold subjective political or aesthetic motives for attending the auction rather than buying from the national wholesale system. Within this general description of buyers, we find a great range of subjective criteria.

Who are these buyers? They may be restaurateurs who want best quality, perfectly ripe produce, non-standard varieties, produced using alternative production methods such as organic. These buyers are also likely to buy some proportion of damaged goods (for sauces and other uses where beauty is not a factor) so long as the product meets other aesthetic criteria. Other buyers might be farmers who operate road-side stands or farm markets who are supplementing their own production. These buyers want ready-to-eat, good quality products with high retail sales appeal. These buyers may also want to be able to advertise “locally grown” products. Depending on location, buyers might include a sprinkling of small institutional buyers such as managers of nursing homes, food kitchens, privately-owned schools, or church groups. These buyers want good quality products that are suitable for industrial food preparation. The transactions at these auctions, although they are wholesale business-to-business sales, exhibit social characteristics more similar to farmer-to-consumer direct marketing.

It is clear, based on the characteristics of the buyers at these auctions, that unlike the Thai auctions, there is little or no consolidation going on. Although we ourselves are not inclined to develop mathematical models in the course of our research, the task of modelling a market where price, quality and volume are nearly independent seems almost impossible.

### **Conclusion**

We can offer a few definitive answers about auctions at this stage. Much of the data we want is not available and some sources of information are averse to sharing what they know. The research protocols are proving difficult to conceptualize.

One of the most pressing issues is the need to quantify how much of the benefit attributed to Thai rubber auctions comes from improved profitability resulting from the auction mechanism, how much from time saving, and how much from the value of information exchanged during face-to-face competitive bidding. That is, are the better prices reported a result of the auction itself or of the gradually increasing quality of the rubber on offer?

We are convinced that if we are to continue to investigate the modern auction as a sales mechanism for agricultural products, and especially if we want to promote auctions as a tool to help small-scale farmers, we must broaden the range of descriptors and of products being considered so as to include high volume auctions and auctions of non-perishable commodities such as tea and tobacco in the comparison. We will also have to figure out how to collect quantitative information on the auctions of greatest interest. Eventually we believe it will be necessary to develop a multi-dimensional characterization that discusses how auction mechanisms work along a continuum of farm size, product commoditization, availability of other sales mechanisms, and cultural familiarity with auctions.

This original rather simple research activity has thus become a rather daunting task with wide international implications. We hope that by publishing interim reports such as this, we may spark greater debate among researchers in several disciplines and that this debate will lead to a greater understanding of the role auctions can play in modern agricultural marketing.

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## **The European tropical fruit market: constraints and opportunities<sup>5</sup>**

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### **Abstract**

*The international fresh fruit and vegetable market represents approximately 100 million tonnes. It is one of the agricultural sector's most internationalized products: more than one fruit in every ten has been the subject of an international exchange. However, the majority of trade occurs around just three fruit: citrus, apples and banana. Nonetheless, there is a significant and growing trade in tropical fruit. Growth rates in this category are significant and include pineapple, mango, avocado, litchi and papaya. It is all the more impressive to note that this development is occurring in the more developed markets where fresh fruit consumption is stagnating and even falling. The principal constraints which impact on the fresh fruit sector include: (1) the need to modify the modes of consumption – the increasing importance of consumption away from home and the increasing competition from processed products containing fruit; (2) the increasing power of the multiple retailers – concentration of distribution and price competition; (3) globalization – the increase in suppliers and erosion of price premiums; and (4) the reduction in margins at the production level. Conversely, many opportunities are available to be seized. The health benefits of consuming fresh fruit and vegetables are significant. Tropical fruit offers pleasure and innovation. But such opportunities can only be captured if the public sector works in conjunction with the private sector to demand standardized products, to regulate plant health and to ensure product traceability. In part, this has resulted in the emergence of GLOBALGAP. Taking pineapple as an example, the specificities an importer faces in consigning tropical fruit to Europe will be explored: innovation, competition, logistics, marketing policy, plant health regulation, certification, consumption patterns, prices and margins. As market research cannot be undertaken without data, a short presentation of the principal sources of information will be provided.*

### **Introduction**

My presentation this morning will be limited to the European fresh tropical fruit market. In a few minutes I will give you an overview of the European market, its opportunities and its constraints. I will give you a description of the tropical fruit market in Europe and a case study on the fresh pineapple market. This case study will illustrate all the constraints and opportunities identified.

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<sup>5</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management



### **The European fruit market**

In 2005, total fruit imports were approximately 11 million tonnes. Of this quantity, 1.5 million tonnes was tropical fruit, not including bananas. More interesting, however, is the dynamics of the market. If we study European tropical fruit imports over the period from 1988 to 2005, we notice that imports have increased three fold. On the other hand, the average unit value, while increasing significantly over the period, suddenly dropped at the beginning of 2000 to lose, in a few years, € 200 per tonne, a fall of 7 percent.

The principal fresh fruits imported in the European Union are pineapple (43 percent), tropical nuts (14 percent), mango, mangosteen and guava (13 percent) and avocado (12 percent). Other tropical fruit represent 18 percent of imports or about 250 000 tonnes in 2005. It should be noted that European customs rarely distinguish between tropical fruits except for papaya, dates and cooking banana or plantain.

Since 1988, all tropical fruits, without exception, have posted impressive growth rates. However, the performance of pineapple is exceptional. The volumes have doubled over the last decade. Mango also shows very interesting dynamics in terms of volume, but there has been a consistent decline in its unit value, by about 40 percent. Approximately 100 countries supply the European market. Mango is available throughout the year. Brazil is the leader in this market with more than 40 percent of market share. Central and South America hold the majority of the market and only Israel, West Africa and South Africa that try to compete.

The market for papaya has accelerated from less than 20 000 tonnes at the beginning of 2000 over 40 000 tonnes in 2005. This is primarily due to the development of sea freight from Brazil and the recent interest from German discounters like Aldi. Import prices are clearly retreating; papaya has lost a quarter of its value in five years.

Litchi is a very, very particular market with very strong seasonality. Supply extends from the end of November with fruit coming from Mauritius and Reunion Islands. Supply develops quickly with the arrival of fruit in the second half of December from Madagascar and South Africa by sea containers or reefers until March. From April to May, a small quantity comes by air from Asia. With the arrival of the fruit shipped by sea from Madagascar, the import price drops. The demand seems unlikely to exceed 30 000 tonnes per year which remains concentrated over one rather short period of the year and within limited European countries.

The market for passionfruit is very narrow, with supplies arriving from Kenya, Colombia, Zimbabwe and South Africa. For pittaia, fruit is sourced from Colombia, Malaysia, Viet Nam and Israel. For much of this fruit, the customs' codes do not enable us to capture the diversity of the offer; the range of fruit available is much larger than the list of codes. Trade may take place for just a few tonnes or a few hundred tonnes, perhaps even a few thousands of tonnes.

### **Characteristics of the tropical fruit market**

For tropical fruit there are many unique features: the limited life span; the use of innovative post-harvest techniques; the temperature of transport adapted for each product; and the use of the cold chain or the warm chain throughout the distribution. From a commercial point of view, the European market is characterized by very strong competition. Except for fruits like the litchi, supply is now available all year round due to the capacity to source the fruit worldwide.

Mango is available all year round; the countries of origin follow one another. We see a similar situation for avocado. The calendars between green varieties and Hass varieties are common and for each month, fruit is available from at least three major countries.

Individual countries can seek to extend their presence in the market through developing new varieties. Take Spain for example: Spain has extended its presence in the citrus market through introducing new varieties, which extend the season of supply.

Competitiveness does not however depend on the product itself but, rather, there is a raft of factors which must work together to make an offer which is competitive. This will include the effectiveness of the production and commercial organization, presence in the market, a logistical organization that runs well, additional services like promotions and communication, and working with a mid- to long-term view, not thinking only in the short-term.

As the European consumer becomes more and more selective, the market becomes more and more competitive. Producers have to share the consumer's stomach with numerous other products. Producers must also deal with a demography which is not favourable: the population is aging and thus there is very little real growth. Competition will also come from other food products; dairy products, for example, and substitute products; fruit juices are very serious competitors for fresh fruits.

Another fundamental of the European market is the very inequitable sharing of the added value. If we look at the distribution of the value added for dessert banana between the producer and the consumer, the gross margin is concentrated towards the downstream sectors. Particularly for tropical fruit, we must always consider the various costs associated with the logistics utilized or made possible by the application of post-harvest technologies. For example, whether litchi is transported by sea or by air will have a very significant impact on the final cost. This may range from as much as € 2–8 per kilogram.

Another characteristic of the European market is its very strong concentration in terms of distribution; in particular, the dominance of the multiples in northern Europe, the United Kingdom, Germany and France. The hypermarkets, supermarkets and hard discounters realize between 68 and 83 percent of the sales for fresh fruit.

For new and exotic fruit, the retail price is often significantly higher. Tropical fruits, like all other products, adhere to the product life cycle. They pass through an introductory phase, a development phase, become mature and the finally decline. Each

fruit has its own life cycle. Indeed, pineapple is the perfect example which shows how the life cycle can be reactivated thanks to a technical innovation, in this case a new variety of pineapple. The case of papaya is also interesting. It shows how a change in logistics made it possible for the fruit to move from introduction to development.

The demand for tropical fruit in the European market is very seasonal. Tropical fruits are consumed for the festive periods at the end of the year, Chinese New Year, Ramadan and Easter. Differentiation also occurs in the market on the basis of the mode of production, organic, fair-trading, by varieties, and occasionally on brands.

Public authorities are involved in setting up regulations like the minimal conditions for accessing the European market, phytosanitary regulations, and so on. However, private institutions are also involved in managing the quality of fruit imports through their own quality assurance schemes. Two such standards seem to be crucial at the moment: the maximum level of residues from the public health point of view and the GLOBALGAP certification from the private point of view.

### **A case study – pineapples**

The outstanding performance of pineapple in the international food sector makes it a star. The fresh world pineapple market is about 1 700 000 tonnes and it is difficult not to be enthusiastic about the international fresh pineapple market. Fresh pineapple imports have doubled since 1999 into both Europe and the United States of America. This exemplary performance has arisen, in part, from the emergence of sweet pineapple. In the mid-1990s, the European market lost its dependence on just one variety, Smooth Cayenne, from one origin: the Ivory Coast. The new variety, extra sweet MV2 was developed and Costa Rica emerged as a new origin and a new market leader. While Costa Rica developed very rapidly, it would be wrong to surmise that this success was the result of a simple combination of origin and variety. It is true that variety has proved its worth both in the field and on the supermarket shelves. However, nothing would have happened without the involvement of a transnational corporation, Del Monte, which provided both a logistical and commercial strategy. Costa Rica emerged as the result of rationalization of production, reliable and rapid logistics, efficient organization of sales and a powerful marketing plan.

As a result the MV2 entered the high-quality segment and gradually gained a superior market position. The Ivory Coast was elbowed out of its own market in Europe in only a few years by Costa Rica matching its success. However, the Del Monte honeymoon is coming to an end. In a market where one is so successful, it's not difficult to attract a competitor: Dole, Chiquita, Fyffes and Noboa have each developed their own supply chains, first in Costa Rica, but then extending to Latin America and Africa. Sweet pineapple has dominated the market, taking the top spot from Smooth Cayenne.

Although the battle has already been lost to some extent, Del Monte has announced that it possesses a new variety, Honey Gold, but in the current more competitive market it will be difficult to replicate such a success.

DELEGATE: On the way to this symposium I was reading an article in an English newspaper about Prince Charles, who has a brand of products which he markets. On this brand of products he now indicates the contribution each product makes to global warming. At the same time, the article noted that several restaurants in London and other parts of the world are beginning to talk about the number of air miles that were involved in getting produce onto the table. At a time when the effect of air transport on global warming is beginning to get increasing attention, what implication could this have for the European market for airfreighted fruit and vegetables?

MR LOEILLET: While the market is not yet considering this, work is ongoing to identify more cost-effective ways to reduce the cost of shipping through the development of appropriate post-harvest technologies like sulphur for litchis, or biologically active films for mangoes.

DELEGATE: I found the presentation very interesting, but you conclude by saying that it will be impossible to duplicate this type of success as far as pineapples are concerned. Can this type of success be observed for crops such as banana? You mentioned small banana, or mango; probably a new variety, because the mango has a lot of constraints as a product itself.

MR LOEILLET: If you want to match this kind of success, you have to meet all of the market requirements: a good product, an innovative product and have a very good marketing organization in Europe. For example, Del Monte has segmented the market in Europe into two parts: one part in the north, the other is in the south, so that one product does not compete with the other. You have to protect your innovation and that is the reason why Del Monte has now protected this new variety. To meet all of these things, it is very difficult for a small producer.

## **Economic analysis of value addition along the supply chain of fresh and semi-processed products – the case of *totapuri* mango in South India**

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### **Abstract**

*India is home for over 1 000 varieties of mango and accounts for over 38 percent of the world's mango production. Although exports represent barely one percent of total production, India is still the second largest exporter of mango. Because exports generate higher returns, efforts have been undertaken by government and non-government agencies to expand the varietal base and to comply with international production and packaging standards for fresh, semi-processed and processed fruit products. One of the major varieties used for mango pulp is totapuri. This variety is mainly grown for processing purposes, especially for export. In south India, the main source for totapuri pulp is Chittoor district in Andhra Pradesh, a major market hub for fresh mangoes and home to over 50 semi-processing units that cater to the pulp requirements of domestic and export markets. Most of the units are small scale and require limited investments. Nevertheless, there are a few large scale processors with state-of-the art technology that is required to meet the quality standards of importing countries. The mango supply chain is typically characterized by a large number of actors and outlets, including wholesalers, market agents, retailers, processors and exporters, and a number of other smaller actors, each contributing to a specific stage in the market chain. An economic analysis of the value addition made at the various stages along the market chain is of interest to understand the role of each of the market intermediaries, the risks associated at each level and the distribution of margins among the actors in the chain. This study, based on a sample of 47 growers and 15 other market chain actors, analyses the marketing practices, costs, returns and value added across the supply chain for totapuri mango. The study highlights the constraints in the market chain such as the lack of market information and appropriate technology and limited access to working capital for small-scale processors. Large-scale units need to ensure sufficient supply to operate their factories at full capacity in order to break even. The mango supply chain is not yet integrated and a stable supply of raw material is therefore not guaranteed. This paper attempts to provide alternate strategies for market integration for export oriented production of semi-processed mango.*

## Introduction

Value addition in a production process is only effective if the final consumer is willing to pay for it and the value addition is distributed to all actors along the supply chain. How efficient and equitable this distribution is depends on the movement of three associated but distinct flows along the chain: the physical, monetary and information flows (Crawford, 1997). The smooth functioning of the first is mainly dependent on access to the third, which in turn depends on a number of factors such as technology, infrastructure, policy and financial resources, which are governed by the market forces. This is especially a challenge in the supply chains of highly perishable commodities like horticultural products.

Cross-border supply chains involving horticultural produce have proven to be an instrument that stimulates development of local agro-industry, generating employment and improving access to technology, if the connection between the producers and the different actors within the chain are well managed (van Roekel *et al.*, 2002; Diop and Jaffee, 2005). Although cross-border supply chains for mango pulp have been in operation for some time in India, they are characterized by the absence of coordination or “risk sharing among the participants across the chain” (Preckel *et al.*, 2004).

The Indian agricultural export basket, which comprises both fresh and processed products, is traditionally dominated by mango, although efforts aiming at diversification to other products are clearly visible. Semi-processed mango in the form of mango pulp is especially important, comprising over 25 percent of the export of processed fruit and vegetables and over 80 percent of all mango products (Sudha, 2003).

As the world’s largest mango producer, India accounts for approximately 38 percent of the world mango (*Mangifera indica*) production and is home for over 1 000 varieties. Among the 20 commercially cultivated varieties, *alphanso* (from the western part of India) and *totapuri* (from the south), are the two varieties which cater to the domestic and export demand for both fresh and processed fruit. According to traders in Chittoor, over 80 percent of the *totapuri* produced is processed into mango pulp, of which about half is exported, while the rest is used domestically for manufacturing into juices, jams and other mango products.

Although India has been exporting mango pulp for over three decades, the existing supply chains are not benefiting the actors along the chain equally. In this paper, an attempt has been made to examine the status and function of the supply chain for the variety *totapuri* in Chittoor district in South India.

## Materials and Methods

Data for this paper was collected in the context of a project on the conservation and use of tropical fruit diversity funded by UNEP/GEF. A survey was conducted during the harvest season in June 2006, involving 47 commercial mango growers from the Chittoor district of Andhra Pradesh. Key stakeholders, including five preharvest contractors, three semi-processors and five retailers were also interviewed. Questionnaires were designed to collect information on a range of themes including general household

information; the costs, returns and profit from mango production; the marketing strategies used; and access to credit, insurance, information and networks. The data was analysed using simple descriptive tables to highlight the constraints and prospects of maintaining the supply chain.

## Results

### Mango in Chittoor district

The south Indian state of Andhra Pradesh accounts for 21 percent of the country's mango area and 25 percent of production. Productivity averages 8 tonnes per hectare. Chittoor district, which comprises an area of over 52 000 ha, is the main mango belt. It contributes about 15 percent of the region's mango production (Government of Andhra Pradesh, 2005).

In the farmer's fields up to ten commercial varieties are commonly found with, on average, about four varieties per farmer in our sample and with *totapuri*, *neelam*, *banganpalli* and *alphanso* (locally known as *badami*), being the most extensively planted. Estimates indicate that from the total annual production of 427 000 tonnes, *totapuri* contributes 70 percent (Ministry of Agriculture, 2005). In our sample 93 percent of farmers had some *totapuri* trees making up 60 percent of the total number of trees.

Chittoor is home to over 50 small- to medium-scale semi-processing mango units, located within a radius of 50 km from the mango orchards. These units operate during three months in the year, converting fresh mango (mostly *totapuri* and to a lesser extent *alphanso*) into pulp. In 2003, they collectively processed pulp to the value of US\$26.5 million (Mahendradev and Rao, 2004). Chittoor also has a large wholesale market where the commercial varieties are traded both for fresh and processed consumption, although mango for processing purposes is also supplied directly to processors as they are located near the production centres.

Mangoes in Chittoor are usually produced in a mixed commercial orchard which maintains a number of varieties and trees of different ages. The orchards in this region are mainly large farms of over ten hectares each, although farm size varies from less than one to over twenty hectares. About 50 to 80 trees are cultivated per hectare, which necessitates an initial set up cost of US\$114 per hectare. Because they constitute an important source of farm income, mango orchards in the region are usually well maintained. An annual application of farmyard manure and the occasional application of fertilizers and irrigation are undertaken as part of regular orchard maintenance. The annual maintenance costs vary with the bearing age of the trees in an orchard and range on average from US\$114 to 777 with the largest quantity of fertilizers, manure and pesticides applied during the peak production years of the tree (up to about 40 years).

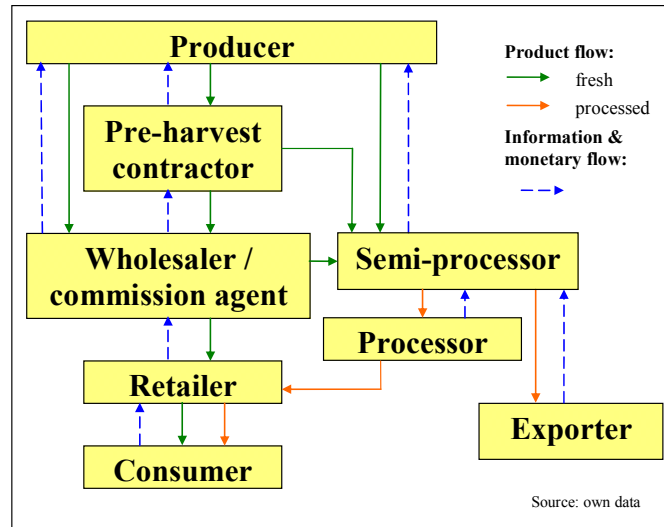
Mango trees come into bearing from the fourth year after planting and continue to yield for up to 60 years. However, the economic benefits are highest 8 to 40 years after planting. A full-bearing, fully grown mango tree can yield up to 60 kg, although mango cultivation is constrained by biennial bearing. This specific characteristic of mango trees

requires appropriate strategies to deal with the instability in production, such as diversification in age and varieties.

### The mango market chain

Figure 1 presents a simplified diagram of the market chain and shows the product flow and the information and monetary flows, which flow in the opposite direction.

**Figure 1: Simplified diagram of the fresh and processed mango market chain**



The market chain of fresh and processed mango is characterized by a large number of actors and a number of alternative marketing channels.

Irrespective of the variety or orchard type, mango is mainly sold through preharvest contractors (PHCs), although farmers also market the product themselves. The PHC enter into a contract with the farmer three to four months prior to the harvest season, based on the flowering of the orchard. The PHC will also undertake some of the maintenance of the orchard. The PHC enters into contracts with several farmers and is therefore able to achieve economies of scale by amassing the produce. By entering into a contract with the PHCs, farmers transfer their production and marketing risks down the market chain. The specific characteristics of mango production and sale – such as the biennial bearing of mango trees, high transaction costs and the lack of access to credit – encourage producers to enter into an agreement to sell to the PHC.

Although much has been accomplished to enhance the marketing infrastructure, such as establishing markets nearer to production centres, the dominance of the PHCs still persists due to the characteristics of mango production and marketing already described and the need of growers to mitigate their risks. The farmer or the PHC transports the harvested mango to the wholesale market, where it is auctioned by a wholesale or commission agent. The commission agent owns or rents an auction lot during the mango season and auctions the fruit to processors, retailers and petty vendors. To facilitate these transactions, the commission charges a fee to both the seller and the buyer. A few large-scale farmers also sell directly to processing units.



Given that the processing units are located close to the production centre, the farmer has the option of supplying directly to the processor. Most of the processors are small-scale canning units with investments up to US\$50 000 (with a capacity of 10 tonnes per hour) (Ministry of Agriculture, 2005). There are only a few units with state-of-the-art technology for undertaking aseptic packaging, which necessitates an investment in excess of US\$125 000 (5 tonnes per hour capacity). The process for aseptic packaging, which produces a higher quality product with a higher market value, is more rigorous and time consuming than that of the canning process and requires much more costly processing equipment.

The processing units undertake customized processing based on orders from exporters. The raw material and the packing material (tin cans) are supplied by the exporter, while the semi-processing units simply convert the fruit into pulp using the available infrastructure and labour. The amount paid to the processor to conduct this activity is US\$50 per tonne of pulp. Processing units also undertake their own processing, procuring the raw fruit from the market. Working capital of over US\$50 000 per export container (6 000 cans or 18.6 tonnes of pulp) is required. The final product of this processing stage is a semi-processed product, mango pulp, which is usually canned or in some cases packed in aseptic packaging. The exporter bears the costs of transporting the pulp to the port and exports to different destinations by sea.

#### **Value addition and margins in the chain**

In the marketing chain, each market intermediary performs a specific function or value-adding activity, in anticipation of remuneration that is directly proportional to the quality of the service rendered. However, when power in the chain is not equally distributed among the chain actors, there will be no equitable division of value added in the chain. This concentration of power with a specific market intermediary stems from their access to market information and their ability and capacity to take higher risks, thereby leading to differences in margins among the supply chain actors (Preckel *et al.*, 2004). Although bearing of higher risk should be rewarded, a lack of transparency in the chain causes disproportionate differences in the margins at different levels in the chain. In this paper, an attempt has been made to analyse the production and marketing costs and margins along the market chain for both fresh and processed mango. The market chain of processed *totapuri* is analysed up to the level of export, therefore the semi-processor's sale and margins are also calculated as a share of the export price.

Table 1 presents the costs and margins for fresh and semi-processed *totapuri*. These figures are based on averages of the sample and comprise all costs incurred in the chain. The highest margin in the fresh *totapuri* chain is earned by the retailer (28 percent), followed by the wholesaler (16 percent), farmer (10 percent) and lastly the PHC (9 percent), whereas in the processed chain, the exporter receives the highest share (17 percent). The PHC in this chain is better off than in the fresh chain (11 percent) and is only then followed by the processor (7 percent) and finally the farmer (6 percent).

In real terms there is no price difference for the farmer. However, as indicated above, their relative margin is lower in the processed chain. The PHC however is able to increase the margin in real terms due to the elimination of the commission agent (and thus paying commission) from the chain. Transport and handling costs are also reduced

due to direct delivery to the processing units that are located nearer to the farmer fields and the fact that less sorting and handling is involved than in the wholesale market.

**Table 1: Marketing margins and price spread**

Fresh			Processed		
	Value (Rs/kg)	Percent of total		Value (Rs/kg)	Percent of total
<b>Farmer</b>			<b>Farmer</b>		
Net price	1.63	10.19	Net price	1.63	6.14
<b>PHC</b>			<b>PHC</b>		
Buying price	3.00	18.75	Buying price	3.00	11.30
Costs			Costs		
<i>Transport</i>	0.12	0.75	<i>Transport</i>	0.01	0.04
<i>Handling</i>	0.30	1.88	<i>Handling</i>	0.01	0.04
<i>Commission</i>	0.42	2.63	<i>Commission</i>	0.01	0.04
Margin	1.41	8.81	Margin	2.97	11.19
<b>Wholesaler</b>			<b>Processor</b>		
Buying price	5.25	32.81	Buying price	6.00	22.61
Costs	0.65	4.06	Costs	0.06	0.23
Margin	2.60	16.25	Margin	1.91	7.20
<b>Retailer</b>			<b>Exporter</b>		
Buying price	8.50	53.13	Buying price	7.97	30.03
Costs			Costs		
<i>Transport</i>	2.50	15.63	<i>Cans</i>	3.33	12.56
<i>Handling</i>	0.50	3.13	<i>Reforming &amp; filling</i>	1.67	6.29
Margin	4.50	28.13	<i>Packing</i>	0.02	0.09
			<i>Transport to port</i>	0.25	0.94
			<i>Sea freight</i>	2.53	9.52
			<i>Commission</i>	0.64	2.41
			<i>License</i>	5.56	20.95
			Margin	4.57	17.22
<b>Consumer price</b>	16.00	100.00	<b>Export price</b>	26.54	100.00
Price spread	14.37		Price spread	24.91	

Some large-scale producers who are located in the vicinity of the processing units are able to make direct deliveries to the processing units, thereby substantially increasing the margin they receive. The processor's margin reflects the level of risk undertaken by this chain actor, for the work is contracted and own-investment is thus limited. This results in a relatively low level of risk and low costs. Along the market chain of processed mango, the fruit is increasingly bulked due to a concentration of the produce with a reducing number of players at each stage in the chain. This implies that income, in real terms, will increase along the chain.

The difference between the price paid by the ultimate consumer and the price realized by the producer is the price spread. In the case of fresh and processed *totapuri*, this is Rs14.37 and Rs24.91 per kg respectively. Although the price spread is significantly different in the two chains, because the costs involved in processing are much higher,

this is not reflected in the margins earned in real terms. Processing costs are divided among two chain actors, the processor who only incurs the labour costs and the exporter who bears all other expenses and more risk. Consumer prices for fresh product are based on the average in the sample and thus reflect differences in quality. Processor prices are predetermined by buyers before the start of the harvesting season.

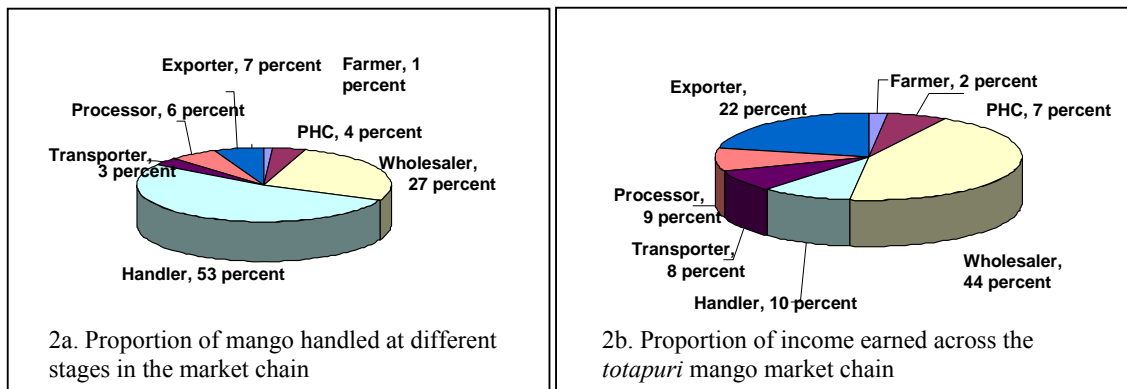
**Employment creation**

Besides the prominent actors in the chain such as the PHC, wholesaler or commission agent, retailer, processor and exporter, others can also earn an important part of their livelihoods by participating in the mango trade. Employment is provided to a large number of people who are involved in odd jobs such as loading and unloading, sorting and grading at the market yard and sorting, cleaning, cutting and packing at the processing unit. Also transport at all stages in the chain provides employment for many.

During the mango season, families temporarily migrate to the market in the urban area or the processing units from as far as 200 km away to earn a living. During those years when the quantity is high, it is not uncommon that some of them also act as small (on the spot) retailers.

Jobs performed at the processing level are under threat by the increased use of automated machinery that is required for the aseptic packing. Figure 2a shows the share of mango handled by different actors involved in the mango chain at all stages. The “handler”, who can be a loader or sorter at the wholesale market or processing unit, seems to handle a disproportionately large share of mango. This is due to the fact that these actors handle the mango at several stages in the chain. These costs were shown in the table as handling costs. Comparing this share to the proportion of income as depicted in Figure 2b, it becomes clear that the income they earn for undertaking this job is low.

**Figures 2a and 2b: Proportion of quantity handled and distribution of margins at different stages in the mango market chain**



As can be seen from Figure 2b, the wholesaler and exporter earn the highest margin in the totapuri trade.

### **A model for integrating production and processing through marketing for quality and sustainable production**

With the increased attention on food safety standards, the demand for aseptic packaging of pulp for the export markets is increasing. This type of process requires substantial investments in sterile processing and packing technology and material and laboratory testing facilities. In south India, there are only two such units: one in Chittoor and one in Bangalore. Because the daily requirement of raw material for these units is around 160 tonnes of fresh mango (24 hours after which the process is interrupted by a sterilization process required for production according to Hazard Analysis Critical Control Point standard), sourcing of raw material in the appropriate quantity, with the required maturity, for the requisite price, is a crucial constraint in the process. With the high level of fixed investment involved, it is essential for processors to utilize the unit at full capacity at all times during the mango season. The international buyers fix the price of mango pulp before the start of the harvesting season and processors therefore face a large profit reduction when the price for raw material rises.

In view of the vast investments involved in the advanced (aseptic packing) processing units and their raw material requirements, efforts have been made to develop a cost-effective yet sustainable model to integrate production and processing with the required quality for the export market. The “Horticultural Mission” of the Indian Government (an initiative launched in 2003 that aims to reform the horticultural sector), research organizations and private entrepreneurs are aiming to establish technology parks in the mango producing areas that have the potential for processing and export-oriented production. As a first step in this direction, the Government has identified areas that have a large area under mango as “Agro Export Zones” (AEZs), where several incentives are provided to producers and processors to improve their production.

Two models have been introduced to attain vertical integration across the chain. The first aims to create infrastructure, i.e. setting up state-of-the-art processing technologies on a large scale, close to the production centres. As a result, the link between farmers and processors is strengthened. Although this model, introduced in the mid 1990s by the Indian Tobacco Company (ITC), is successful to a limited extent, the benefits of market information have not trickled down to the farmer. With the number of semi-processing units in the area increasing over the years, farmers, PHCs and commission agents alike allege that processors are controlling the market price by forming cartels, resulting in a major reduction in the specific advantage of this infrastructure.

Secondly, the government has made efforts to promote the establishment of so-called “Technology Infrastructure Parks” (TIPs), which provide centralized facilities for processing and packing to producers or semi-processors who wish to set up a processing centre at reduced rates, thereby allowing them to utilize the resources and reduce their fixed investment costs and overheads, resulting in higher profits. In addition, the central unit also offers market information on quality parameters, standards, arrivals and prices in different export destinations, in order to assist entrepreneurs to benefit from trade. It is important to ensure that the price benefit realized by an effective market information system is distributed along the market chain. This second effort however has also failed to achieve the vertical integration intended. A few large processors dominate by

acquiring the produce of small-scale players operating on job work or customized processing, thereby still benefiting from economies of scale.

Apart from the interventions at the processing level, efforts are also required to minimize or eliminate the apparent oligopoly at the wholesale level, which has been indicated by many as a major barrier for a more equitable distribution of margins along the chain (Deodhar and Pandit, 2002; Gadre *et al.*, 2002). Otherwise, wholesalers may acquire a major share of the margin, disproportional to the role played and the risk taken. This will require collective action in a three-tier structure, grouping farmers at community level into self-help groups, identifying processors at the district level who procure fresh material directly from these groups and who, in turn, are integrated with exporters to export the semi-processed pulp under one brand name. Obstacles that have to be overcome for such an intervention to become successful are manifold and include export demand inconsistencies; lack of transparency and information sharing in the market in terms of price, quantity and quality; a lack of trust among the chain actors; difficult and cumbersome taxation policies; and the absence of initiatives to build brand names.

### **Conclusions**

Comparison of the market chains of fresh and processed *totapuri* mango has highlighted the constraints in the mango market chain. First of all, producers lack information about the differentiation in the chain and therefore are not rewarded in terms of price. The PHC bears a high level of risk, because it is transferred by the farmer through the closure of a contract during the flowering season, when the actual harvest can still be affected by many variables (such as weather and natural hazards). The margin earned by the PHC reflects this risk. On the other hand, the risk borne by the commission agent is very limited, while the margin at this level is very high. Dealing with the power of this intermediary would be an important step towards the more equitable distribution of marketing margins in the chain. At the processor level, there is a problem with regard to the lack of appropriate technology and limited access to working capital for small-scale processors. Advanced large-scale units, which have made substantial investments to acquire the appropriate equipment, on the other hand, have the problem of a constant raw material supply to operate their factories at full capacity in order to break even.

A solution to these processing problems may be offered by integrating the mango chain and the establishment of technology parks. It is also important to keep in mind the employment opportunities and the livelihood support the existing chain offers, and to make necessary arrangements to safeguard the income sources of all those involved.

Finally, it is important to note that the income of most of the chain actors largely depends on the mixture of varieties maintained in order to spread risk, prolong the mango season and benefit from varietal price fluctuations. Besides regoverning the mango chain, it is important to promote the maintenance of on-farm diversity.

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## **How supply chain management gives benefits to banana growers**

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### **Abstract**

*Banana is one of the main horticultural commodities in Indonesia and it is one of the most important export commodities. In Indonesia, banana is mostly cultivated and distributed to consumers through a long and complex supply chain. This both limits the amount of good quality product that is available to consumers and the revenue that is available to growers. A study of the banana supply chain from Lampung district to the Cengkareng wholesale market in Jakarta indicated that 5–6 levels are usually involved in traditional supply chains. On the other hand, in Lumajang district, only three levels were employed. In traditional banana supply chains, most of the activities are performed by traders in the Cengkareng wholesale market, where the fruit is stored, ripened and offered to retail buyers. Product losses are high. In the improved banana supply chain, many of the value-adding activities are performed by farmer cooperatives. The improved banana supply chain has a better payment system where the cooperative buys the fruit from the growers in cash. However, in traditional banana supply chains, collector agents buy the fruit using three payment systems: advance payment, advance loan and credit terms. This results in the grower having a weak bargaining position. As the long chain distorts information on price and fruit quality, growers are often unaware of quality problems. As a result, they do not get a good price. In the improved supply chain, the cooperative provides guidance and advice to the growers about the quality that is required by consumers, resulting in a better price. By implementing improved supply chain management, it is possible to shorten the chain and increase the market value. Besides, modern retail markets require better quality fruit than the traditional banana supply chain.*

### **Introduction**

Banana is one of the main horticultural commodities in Indonesia. It is the major fruit produced (40–45 percent) and it is the major fruit exported. Banana is widely grown in Indonesia with production centres located in 14 provinces. The biggest banana production centres are in West Java, Central Java, East Java, South Sumatra, Lampung and North Sumatra.

The major banana varieties cultivated are Ambon, Kepok, Nangka, Tanduk, Lampung, Raja and Mas. These are consumed as fresh or processed banana. Generally, bananas are traded in bunches so that they are easier to handle and will have a longer life. However, for specific markets such as supermarkets, hypermarkets and fruit stalls, bananas are traded as hands. Mas Kirana is one species of the Mas banana variety. This banana is very suitable for fresh consumption because of its small size (length: 70–100 mm, diameter: 24–32 mm), bright yellow flesh colour and sweet taste. Mas Kirana is mainly grown in Lumajang District in East Java.



In general, growers cultivate banana using traditional methods. Most have access to only limited technology, so that fruit produced is often of low quality. Moreover, there is no post-harvest handling and no cooling system available to improve quality.

The traditional supply chain for bananas is generally long and complex. Fruit often has to travel very long distances from the production centres to the wholesale market. Invariably, poor handling results in significant product losses. Before the fruit reaches the wholesale market, fruit is traded by collector agents at the village level, subdistrict level and district level. Traders in the province then sell the fruit to interisland traders who consign the fruit to wholesale markets in Jakarta such as Cengkareng.

Lumajang district, East Java, is the production centre of Mas Kirana. In this area, Mas Kirana is cultivated using more advanced techniques, so the fruit is generally of better quality. Rather than sell banana individually, growers in Lumajang district sell their fruit through a cooperative. Moreover, the cooperative has a good relationship with a trader who supplies banana to modern markets such as supermarkets and hypermarkets.

A previous study evaluated the banana supply chain in Cikalong, West Java, Indonesia (Setyajit *et al.*, 2003) and from Lampung Province to the Cengkareng wholesale market (Kuntarsih *et al.*, 2005). In this study, we compare the complexity of the traditional banana supply chain with the improved banana supply chain in Lumajang, East Java.

### **Method**

Research was conducted in 2004 and 2005 through a case study. The object of this research was the supply chain for banana from Lampung province to the Cengkareng wholesale market which is located in the city of Tangerang. This is compared to a much shorter supply chain for fruit from Lumajang District in East Java. Data was collected by personal interview, observation and the distribution of questionnaires.

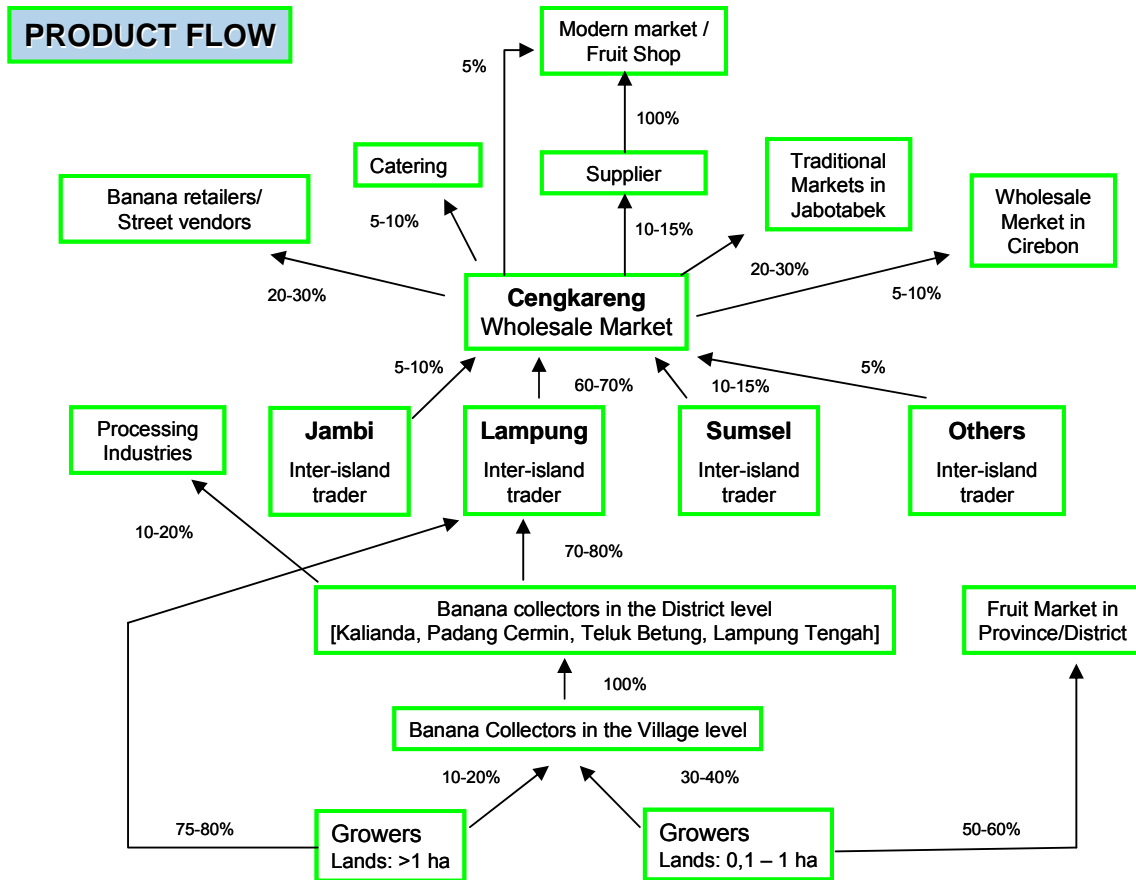
### **Results and discussion**

Generally, banana trading in Indonesia has been done for years through a trust system between growers, collector agents at the village, district and provincial level, interisland traders and the wholesale market. This traditional supply chain is long and complicated involving many stakeholders, from the growers to the traders (Figure 1).

However, it is possible to shorten the supply chain from growers to consumers. Figure 2 shows the improved supply chain operating in Lumajang district, East Java. In Lumajang, growers sell their fruit to a cooperative where it is mainly distributed to traders (70–75 percent), with 10–25 percent sold to traditional markets, and 5 percent direct to retailers and street vendors. Traders sell the bananas to modern retail markets including supermarkets, hypermarkets and fruit stalls.

On the other hand, in the traditional supply chain, only 10–15 percent of the fruit goes to traders. Therefore, modern markets only receive a limited quantity of good quality fruit. The other 85–90 percent of fruit is distributed to consumers through banana retailers, street vendors and traditional markets, where the fruit quality is low.

**Figure 1: Product flow of the traditional banana supply chain in the Cengkareng wholesale market from growers to retailers**

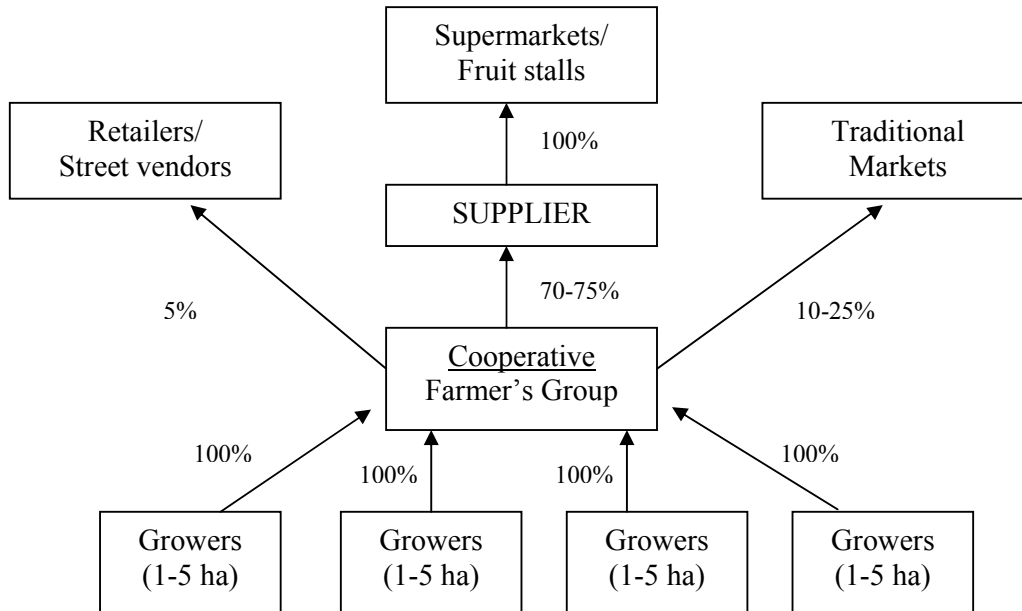


Source: Kuntarsih *et al.* (2005)

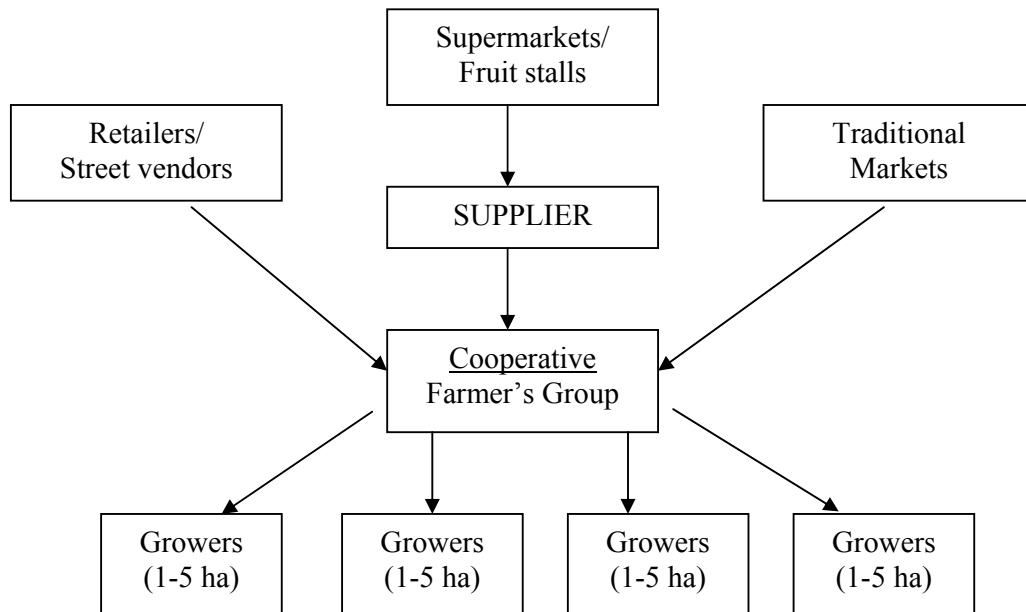
For growers and fruit traders, information is important to maintain the supply. This includes information from the fruit collectors at the district and village level, information about consumer demand and behaviour, product losses and other problems in the wholesale trade. Information from the collector agents includes the selling price, fruit quality and delivery. Information about consumers is also important, especially from the fruit vendors, institutions, fruit shops, supermarkets and individual consumers.

In the traditional supply chain, this information seldom reaches the growers clearly. Information on quality requirements and price are determined by the fruit trader in the Cengkareng wholesale market. Then, this information is distributed to the interisland traders and collector agents at the district and village level. Finally, it reaches the growers. Not unexpectedly, this can bias the information received by growers. Besides, collector agents buy all the fruit irrespective of quality. Therefore, growers do not know what the exact quality requirements are, so they cannot differentiate between good and poor quality fruit. As a result, their fruit attracts a low price. In the improved banana supply chain, growers receive information about quality requirements and price more quickly and the information is more accurate (Figure 3).

**Figure 2: Product flow of the improved banana supply chain in Lumajang District East Java**



**Figure 3: Information flow of the improved banana supply chain in Lumajang District, East Java**



In this case, the trader provides information to the growers through the cooperative and growers provide fruit that matches the quality standards required by the customer. As a result, growers are more aware of the fruit quality requirements and they cultivate banana more intensively by implementing more advanced technology.

Generally, growers cultivate bananas with limited technology. They provide plant material which is usually derived from their own seedlings and suckers. Growers apply a minimum of manure, fertilizer and pesticides for their crops. As a result, growers may be unable to harvest as a result of pest and disease infection, nutrient deficiencies and natural disasters.

Post-harvest activities in the traditional supply chain are mostly performed by traders in the Cengkareng wholesale market. Traders pay for the cost of ripening, transportation, the rental fee and product losses. Collector agents purchase banana from growers and are responsible for harvesting and transportation from the field to the collection place. Collectors at the district level are responsible for transporting bananas from the village to the district, from the district to Lampung, and thence to the processing industry. In Lampung, interisland traders dispatch bananas to the Cengkareng wholesale market. All three types of collector agents risk fruit damage during transportation.

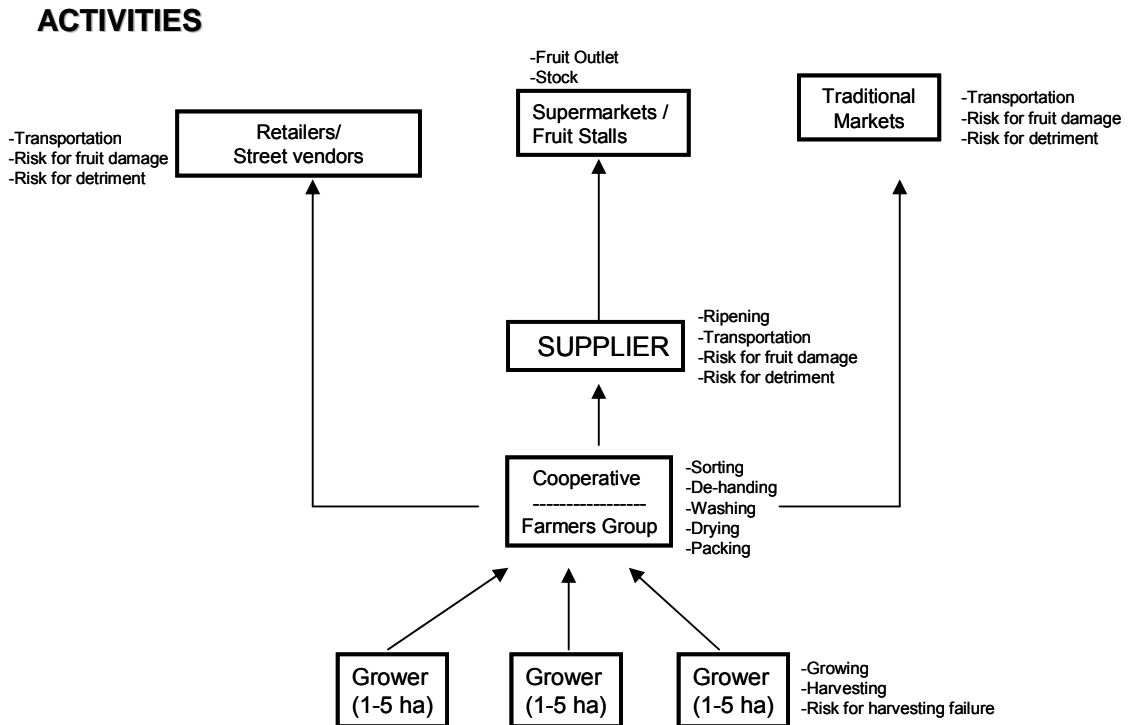
In the Cengkareng wholesale market, the bananas are unloaded from trucks and ripened. During these processes, the fruit is often damaged, a risk that the traders must cover. The banana ripening rooms are simple (an air conditioner), and traders use carbide to ripen the bananas. From the wholesale market, bananas are then dispatched to the street vendors, caterers, supermarkets and fruit shops and traditional markets around Jakarta, Tangerang, Bogor and Bekasi, and the wholesale market in Cirebon. As the fruit moves between market intermediaries, further damage is often inflicted.

In the improved banana supply chain, post-harvest handling is done by the cooperative, which includes sorting, de-handing, washing, drying and packaging. In the cooperative, fruit is treated carefully to meet the requirements of the customer. Growers have started to implement Good Agricultural Practices (GAP) to produce safe, good-quality fruit. They have also implemented Standard Operational Procedures (SOP) for the Mas Kirana. The trader buys bananas which meet prespecified quality criteria and it provides packaging to the cooperative. In this case, the trader and his or her downstream customers experience less fruit damage and deterioration (Figure 4).

In the Cengkareng wholesale market and other fruit trading levels, banana trading is done using three payment systems: cash; one or four weeks credit terms; and consignment, whereas, at the grower level, the transaction is done by various ways such as advanced payment, advanced loan before harvest and credit terms (Figure 5).

In the traditional banana supply chain, collector agents usually buy the fruit in advance from the growers, an advanced loan before harvest, and credit terms. In this case, collector agents control the price, so growers have a weak bargaining position.

**Figure 4: Activities in each channel of the improved banana supply chain in the Lumajang District, East Java**

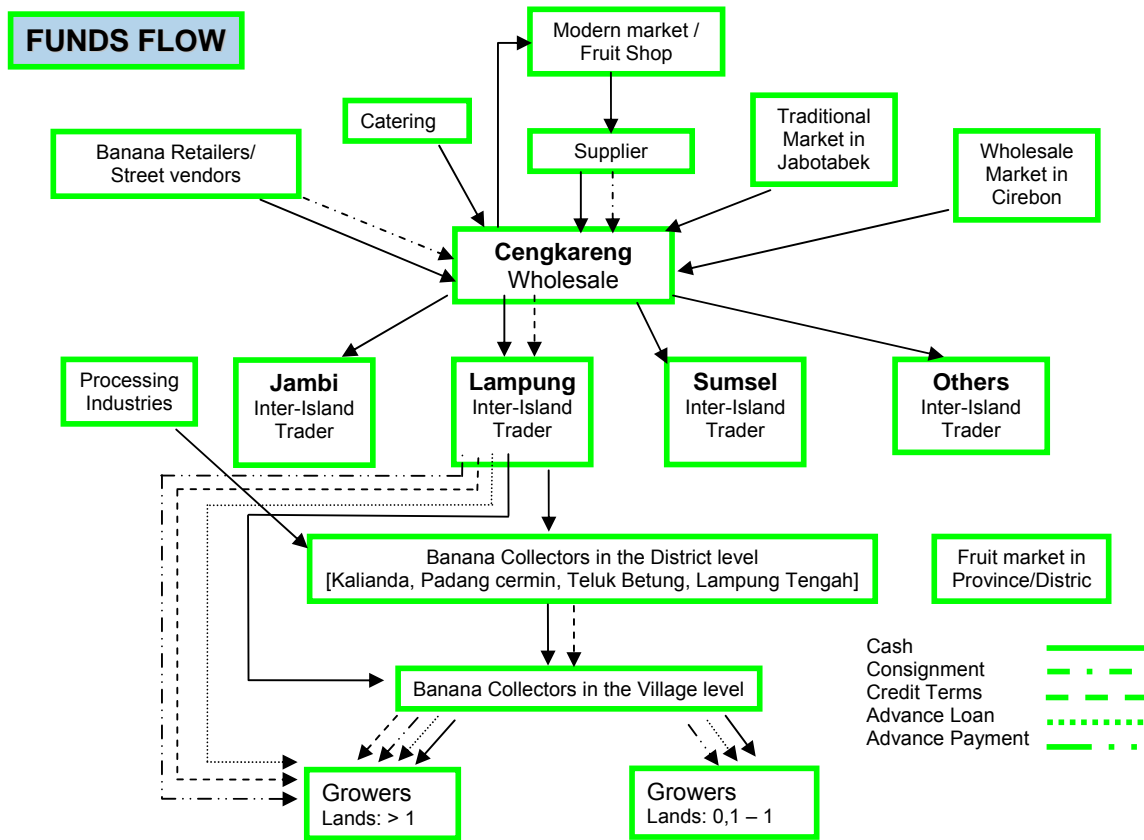


In the improved banana supply chain, the cooperative acts as a negotiator. It provides good-quality fruit to the trader and offers a good price to both the buyer and the growers. Traders buy bananas from the cooperative on two weeks' credit, while the cooperative pays the growers with cash on delivery (Figure 6).

With regard to market information, growers are always in the weakest position. There are no price guarantees for banana, for the price depends on the dynamics of the market. Therefore, the bargaining position of the growers is very weak.

In the improved banana supply chain, the cooperative provides advice on orchard management and marketing. It also acts as the marketing agent and plays a key role as a negotiator. As an advisor, there is a champion who gives guidance to the growers. This champion is chosen from the more advanced growers or from the government service. Besides acting as the marketer, the trader provides information on the price and quality to the cooperative and it also provides the packaging. In this case, the trader acts as a bridge between the fruit buyers such as modern markets and the fruit growers.

**Figure 5: Funds flow of the traditional banana supply chain from the growers to retailers**



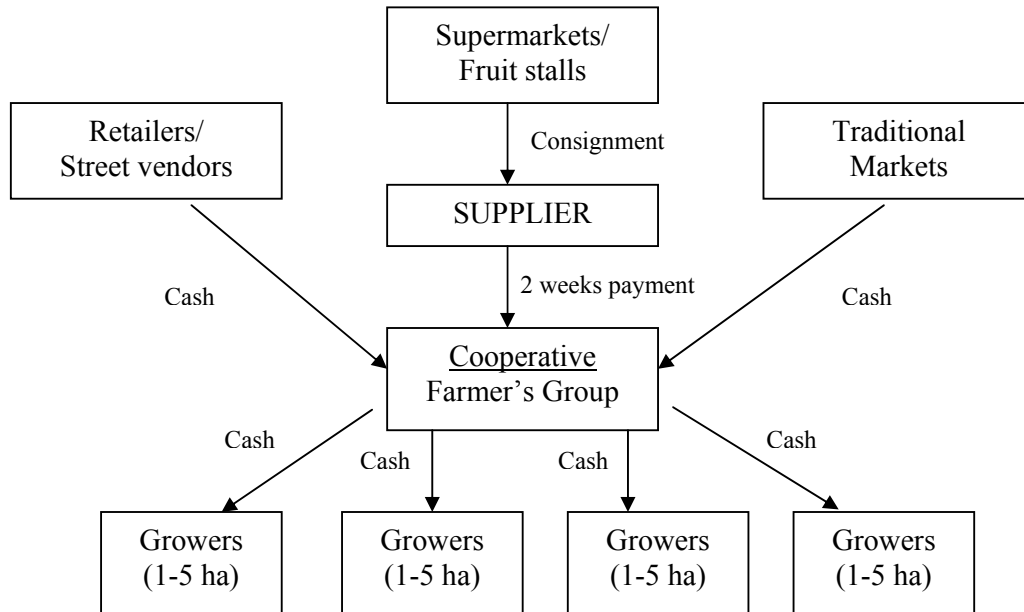
Source: Kuntarsih *et al.* (2005)

An evaluation of the price margin along the traditional banana supply chain indicates that the benefit at the grower level is low and that the retail margin increases as the fruit moves closer to the consumer. Table 1 shows that growers extract a retail price margin of just 20 percent and the price is low (Rp600 per kg). On the other hand, the price at the retail level is high (Rp3 000 per kg), and the price margin is high (30 percent).

**Table 1: Price margin allocation of each member in the banana supply chain**

Traditional banana supply chain			Improved banana supply chain		
Chain member	Price (Rp)	Margin (percent)	Chain member	Price (Rp)	Margin (percent)
Retailers	3 000	30	Retailers	4 700	32
Cengkareng wholesale market	2 000	20	Supplier	3 200	43
Inter Island Trader	1 700	15	Cooperative	1 800	5
Collectors (District)	1 100	10	Growers	1 000	20
Collectors (Village)	900	5			
Growers	600	20			

**Figure 6: Funds in each channel of the improved banana supply chain in the Lumajang District, East Java**



On the other hand, in the improved banana supply chain, growers achieve a much better price of Rp1 000 per kg, although the retail price margin is similar to the growers in the traditional supply chain. Although growers receive only 20 percent of the retail price margin, they have a market guarantee and a defined demand with the promising price. The trader must maintain fruit quality and provide good quality products for the modern markets. Therefore, they have the highest price margin (43 percent).

Figure 7 illustrates the comparison of the traditional supply chain and the improved supply chain. In the traditional supply chain, growers usually sell their product in bulk without any post-harvest treatment. The fruit is packed into simple containers and furthermore, the fruit is seldom graded. The supply chain through which this fruit passes is long and complex and as a result product losses are high. Only 55–60 percent of good quality fruit ultimately reaches the market.

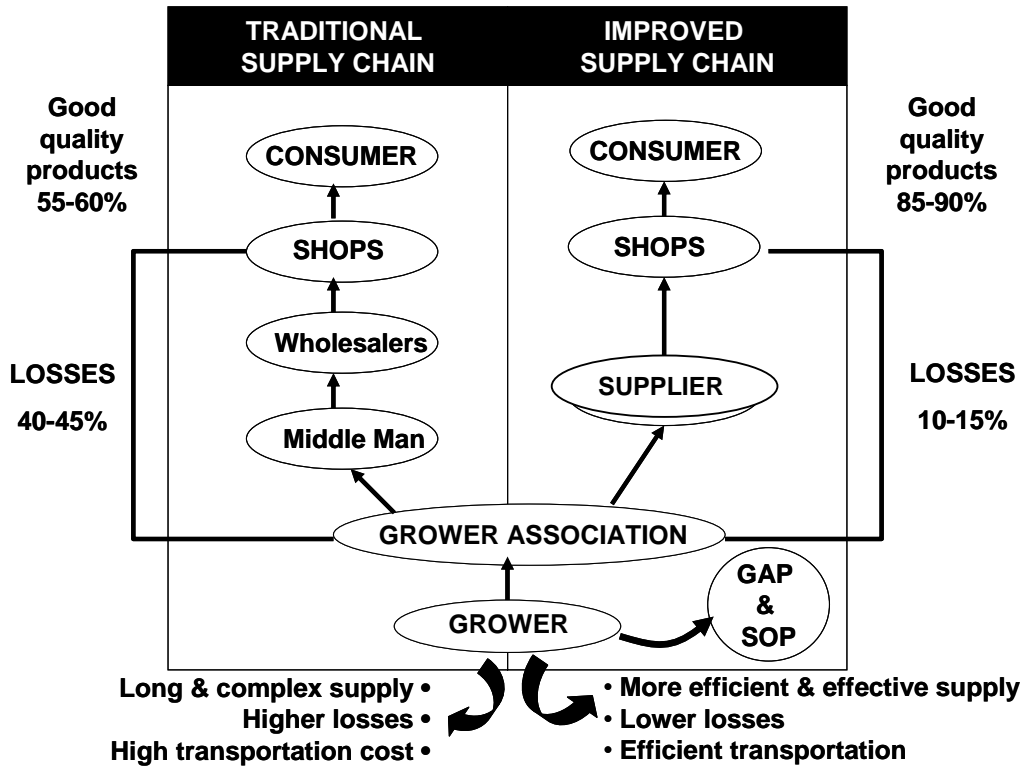
In the improved supply chain, growers sell their fruit to the grower cooperative which has a long-term relationship with the trader who will sell the fruit to the modern retail market. The benefits of this improved supply chain are that growers are encouraged to supply good-quality products and to implement GAP and SOP. The shorter supply chain reduces losses by 30 percent. As a result, more good-quality fruit can be supplied to consumers in both the domestic and export markets.

### Conclusion

The majority of banana growers in Indonesia are small-scale businesses and they are scattered in villages. Growers usually manage their businesses individually so that their

bargaining position is weak and they are highly dependent on collector agents in the village. Generally, the quality of the banana offered for sale is low, due to the limited implementation of pre- and post-harvest technologies and inappropriate infrastructure. At the grower level, the resultant price is low. The supply chain from the growers (in Lampung) to the Cengkareng wholesale market is long and complicated. Many stakeholders are involved and their relationships are strong.

**Figure 7: Comparison of the traditional supply chain and the improved supply chain from grower to consumer**



There are efforts to improve the performance of the supply chain through the application of pre- and post-harvest technology. The encouragement of mutually beneficial relationships between growers and traders (wholesale market, fruit traders and modern market) can provide greater profits for the growers. However, these need support from private and government institutions.

By implementing an improved supply chain, it is possible to shorten the chain and increase the market value. Growers become more aware of the fruit quality that is desired by downstream customers and they achieve higher prices. Besides, the modern retail market requires better-quality fruit compared to the traditional market.

### Acknowledgements

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## **Current status and future prospects of litchi exports from India**

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### **Abstract**

*India is the second largest producer of litchi in the world after China. However, with an average productivity level of just 7.6 tonnes per hectare, India lags behind many other exporting nations. Litchi has very specific climatic and soil requirements, restricting litchi cultivation to only a few countries, yet Indian exports of fresh fruit and processed litchi products are low. Nevertheless, India has tremendous potential to export litchi because of the existence of a window of opportunity in the European market and the presence of a wide range of litchi germplasm. However, the lack of infrastructure and the non-availability of export quality fruit, due to improper preharvest practices, coupled with low productivity and high prices, make Indian exports non-competitive in the world market. In view of the rising need to export chemical-free fruit, litchi will benefit from integrated pest management. IPM strategies and their proper implementation in orchards to promote sustainability and to reduce the application of hazardous chemicals are important. To promote litchi cultivation and export, the Government of India has developed three commercially important litchi growing zones in the country, namely Uttaranchal, Bihar and West Bengal. With favourable agroclimatic conditions and free marketing opportunities, there is a bright prospect for high-quality litchi production and export from these litchi export zones in India.*

### **Introduction**

Litchi (*Litchi chinensis* Sonn.) is the most delicious and nutritious summer fruit in India. It is commercially grown in Bihar, Uttaranchal, West Bengal and Uttar Pradesh. Due to its high economic returns and good export potential, the crop is also gaining momentum in Punjab, Himachal Pradesh, Arunachal Pradesh, Jammu and Kashmir, Tripura, Karnataka and Tamil Nadu (Pandey and Sharma, 1999; Cebeco, 2001).

India is the second largest producer of litchi in the world after China. Presently, litchi is cultivated on over 56 200 ha with total production exceeding 428 000 tonnes (NHB, 2006). However, the national average productivity of litchi is just 7.6 tonnes per hectare, which is much lower than the potential yield under managed conditions.

The short span of fruit availability, coupled with poor shelf life, limits the availability of litchi on the domestic as well as the international market. The fruit is available from 15

May to 15 July and the shelf life varies from three to five days. With the proper post-harvest treatment (sulphuring), the shelf life can be extended to up to three weeks.

At present, about 37 000 tonnes of litchi are exported from India to the Middle East, Europe, Russia and Canada. APEDA and NAFED are the major export promoters of Indian litchi. In the international market, litchis are available from November to March from countries like Australia, Mauritius, South Africa and Madagascar. Conversely, the availability of fruit from India coincides with the period of least production in May to July.

### **Export-oriented varieties of litchi in India**

In India, about 50 cultivars of litchi are cultivated. However, Shahi, China and Purbi are the leading commercial varieties for North Bihar and eastern Uttar Pradesh; Purbi, China and Deshi for North eastern Bihar; Rose Scented for Uttaranchal and adjoining areas; Shahi, Ajhuli, Chaina, Swarna Roopa and Purbi for Jharkhand; and Bombai, Bedana and Rose Scented for the eastern parts of West Bengal.

Shahi is the most popular cultivar in North Bihar and Jharkhand, Uttaranchal and Uttar Pradesh. The fruit has a distinctive aroma and is often called Rose Scented. It is known as Shahi in Bihar, Rose Scented in Uttaranchal and Muzaffarpur in Western Uttar Pradesh. This is an early season maturing cultivar which ripens in the last week of May to the first week of June. Trees are very vigorous (7.6 m in height and 8.2 m in canopy width) and very productive (90–100 kg/tree), but mature fruits are prone to cracking. Fruits are medium to large in size (3.2 cm length and 3.1 cm diameter) and have a fuchsia purple background with red tubercles at ripening. The pulp is greyish–white, soft and moderately juicy.

Early Bedana is also known as Early Seedless because of its early ripening and small seeds. The cultivar is very popular in Uttar Pradesh and Punjab. Trees attain an average height of 5 m and canopy spread of 6.2 m. It is a medium yielding cultivar (50–60 kg/tree), which bears fruits regularly. Fruits are medium in size (3.2 × 3.0 cm) with a rough surface and uranium green skin, covered with carmine red tubercles at maturity. The pulp is creamy white, soft and juicy. The seed is very small and the overall fruit quality is good.

Late Bedana is also known as Late Seedless. This is a late maturing cultivar which usually ripens in the third week of June in Uttaranchal and the end of May in Jharkhand. The trees are vigorous with an average height of 5.5 m and spread of 7.5 m. It is a high yielding cultivar, giving an annual yield of 80–100 kg/tree. The fruit size is of medium size and the pulp creamy white, soft and juicy. The quality of the fruit is very good.

Swarna Roopa is a medium-late maturing, crack resistant cultivar selected at CHES, Ranchi. The fruit are attractive red in colour with a small seed and high pulp percent.

CHES-2 is a late maturing genotype. The tree is medium to vigorous in growth. This variety bears fruits in the outer canopy as well as in the inner canopy, thus reducing the

incidence of sunburn as well as fruit cracking. The fruits are deep red, conical in shape and appear in a cluster of about 15 to 20.

Ajhauli is another early maturing variety that is ready for harvest mid-May. Yields average 70–95 kg per tree. The tree is vigorous in growth, bearing red fruit.

China is one of the best cultivars for North India. It is tolerant to high temperatures and fluctuations in soil moisture, making the fruit less susceptible to cracking. This is a medium-to-late season cultivar with the fruit ripening at the end of May in West Bengal, in the first week of June in Jharkhand and in the third week of June in North Bihar. Trees are only 4 m high, but with 6 m spread. Although it is a high-yielding cultivar (80–100 kg/tree), it is prone to alternate bearing. Fruits are large in size (3.86 cm length and 3.26 cm diameter), of medium weight (22 g/fruit), oblong in shape and tyrant rose in colour with dark tubercles at maturity. The flesh is cream–white, soft and juicy and sweet.

Bombaiya is a vigorous cultivar attaining a height of 6–7 m and a spread of 7–8 m. The cultivar matures in the first to second week of May and produces 80–90 kg per tree. The fruit are large, with an attractive carmine red and uranium green skin background at maturity.

Based on field performance and observations, it has been noted that the water content of China is higher than Shahi. This is because the harvesting of China coincides with the rainy season. A high water content can lead to shrinking of the fruit after the application of sulphur and in some instances, the formation of sulphuric acid which spoils the fruit completely. Shahi, Rose Scented and Ajhauili are very thin skin varieties which make them more susceptible to splitting and sunburn, particularly when high temperatures and dry winds persist for some days. The thick skinned varieties like Early Bedana and China are comparatively free from this problem. Shahi and Rose Scented are very delicate and perishable, but are also the most popular cultivars in the international market (Europe and Middle East).

### **Strengths of Indian litchi exports**

India is second largest producer of litchi in the world. Although the productivity per tree is low, it can be improved by adopting better agricultural practices in the orchards. Litchi has been grown in India since the 18<sup>th</sup> century, hence farmers are very familiar with the crop.

India is accepted worldwide as a source for good-quality litchi. Shahi and Rose Scented are considered among the best varieties in the world, in terms of their taste and flavour. Favourable soil and climatic conditions exist in most parts of the country for commercial litchi cultivation. The harvesting season in India starts earlier than in the People's Republic of China and Taiwan Province, the other main areas of litchi production. This provides India with a significant marketing advantage, especially in Europe. Even with respect to competition from Thailand, which produces fruit at a similar time as India, India is geographically closer to the market.

India has a well-established food processing industry. Entrepreneurs are familiar with the technology and both equipment and trained manpower is readily available.

### **Weaknesses in Indian litchi exports**

Most litchi growers in Uttaranchal are not landowners and operate mostly on yearly contracts. Hence, greater emphasis is placed on maximizing the output in a particular year, rather than the long-term perspective.

The Rose Scented cultivar is highly perishable, due to fruit splitting and skin burning. Despite the large amount of germplasm available, little significant research and development work has been conducted to improve varieties and planting materials.

Planting material is obtained from unproductive and low yielding trees. Farmers are not willing to sacrifice productivity in the short term in order to replace or to rework trees with superior planting material. Over the years, the size of the seed has generally increased, which reduces the amount of pulp and thus fruit quality has deteriorated.

In India, the litchi harvest season is very short, lasting for only about three weeks in a year. Conversely, in Taiwan Province of China and Madagascar, for example, the harvesting season extends for two to three months.

In general, the desired post-harvest infrastructure and transportation is not available to move the fruit from Bihar, the main producing area, to the international airport. The majority of exports from India are conducted by very small exporters, who have limited resources and market reach.

Although India has a well established food processing industry, it generally serves the domestic market. There are no world class food processing facilities available to process litchi. Canned whole litchi is the most popular processed form. In some states, due to manual peeling and destoning, a large percentage of the fruit is broken and is discoloured.

### **Opportunities for Indian litchi exports**

There is tremendous scope for the export of both fresh and processed litchi from India. The quality of the fruit available readily meets the needs of international customers.

Since suitable agro-ecological conditions are available in Uttaranchal, the planting of successful varieties from other countries may provide an opportunity to extend the seasonality of supply and to improve fruit quality.

The commercial viability of litchi processing in India can be enhanced by using it for processing other complementary fruit and vegetables, which have good export potential and for which the harvesting season does not clash with that of other countries, e.g. baby corn, gherkins, snow peas, runner beans, guava, plum, pear and apricot.

The international prices for fresh and processed litchi are quite attractive. Competition is limited, as only a few countries produce litchi and the European market is undersupplied during May to July.

### Threats for Indian litchi exports

The established exporting countries (Taiwan Province of China, Madagascar, South Africa and Thailand) already have well-established export marketing networks. The People’s Republic of China, the world’s largest producer of litchi, is presently not very active in world trade. However, when China decides to aggressively promote litchi exports, it will present a major threat to India. Furthermore, several countries have significantly expanded the area of litchi cultivated. Many of these orchards will mature in the next two to three years, substantially increasing the quantity of fruit available.

Many countries have developed technology for extending the litchi harvesting season to about two to three months, through delayed ripening of the fruit. In India, a stand-alone litchi processing unit, based on modern technology, is unlikely to be viable due to the limited availability of the fruit.

### Seasonality of litchi in the world

Litchi is available throughout the year in some parts of the world, even although the harvesting period for litchi in any one particular region may be very short, i.e. not more than two to three months in a year (Figure 1).

**Figure 1: Harvesting season of litchi in major litchi-growing countries**

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
PR China					■	■	■					
India					■	■	■					
Taiwan Province					■	■	■					
Thailand			■	■	■	■	■					
Viet Nam					■	■	■					
Nepal					■	■	■					
Bangladesh					■	■	■					
Reunion Island	■										■	■
Mauritius											■	■
Madagascar	■	■									■	■
South Africa	■	■	■								■	■
Australia	■	■	■								■	■
USA					■	■	■					
Mexico					■	■	■	■				
Israel					■	■	■	■	■			
Spain								■	■	■		

Source: Gerbaud (2007)

### Post-harvest practices and infrastructure

Litchi fruit is highly perishable, thus rapid distribution and marketing is paramount. Freshly picked litchi will maintain their colour and quality for only two to five days at room temperature. Except for fruit that is destined for the local market, litchi requires

proper post-harvest treatment, packaging and appropriate storage conditions to retain its quality for longer periods. The most important post-harvest need of litchi is the retention of fruit colour and quality so that the marketing can be extended to avoid a glut. In India, fruit for the domestic market is normally packed into baskets or crates lined with other cushioning material. However, for export, fruit needs to be packed individually in shallow, ventilated cartons with shredded-paper cushioning.

Post-harvest sulphur fumigation, acid treatment, pre-cooling and cold storage facilities (cold chain technology) are considered to be the most effective way of preserving the quality of fresh litchi fruit. Unfortunately, this technology is available with only one exporter in Bihar and only one grower in Uttaranchal has the capacity to treat the fruit with sulphur, and then in quantities less than one tonne. If proper post-harvest holding facilities were available, litchi growers would be in a position to secure a better price by marketing their produce in more distant markets over an extended period of time.

### **World trade**

The demand for fresh litchi in the world market has steadily increased during the last decade. The European Union is the largest importer of fresh litchi, followed by Hong Kong, Singapore, Canada and Japan. Although India and the People's Republic of China are the leading producers of litchi, smaller producers like Madagascar, Taiwan Province of China and South Africa dominate the world trade.

#### **The European Union market**

Litchi is the most popular imported Asian fruit. Although the majority of the demand emanates from the Asian communities in Europe, litchi has successfully entered the mainstream markets as well. In the early 1990s, the United Kingdom, the Netherlands and Germany had an almost equal share, which collectively comprised 75 percent of all European Union imports. However, more recently, France has emerged as the single most important market for litchi imports into the European Union, consuming over 75 percent of imports, while the United Kingdom, Germany and the Netherlands make up the balance.

Although Europe receives fruit all year round, the main season is between December and February, with about 90 percent of imports occurring during these months. Even within this period, nearly 50 percent of all litchi imports arrive in the month of December, with the peak demand occurring during Christmas. Madagascar and South Africa are the major suppliers of litchi to Europe between December and February.

#### **India's share of the world litchi trade**

In spite of being the world's second largest producer of litchi, India has a negligible share of the world market. In 2003–2004, India exported only 155 tonnes of fresh litchi valued at Rs15 million (APEDA, 2005). Although world trade statistics for the corresponding year are not available, India's share of the world market amounts to less than 1 percent. The export of processed litchi is not reported separately in official statistics, but it would be reasonable to conclude that this is also negligible. Nevertheless, exports have been increasing steadily.

Into Europe, India is at a disadvantage vis-à-vis Madagascar, due to the mismatch in the seasonal demand as well as the freight cost. On the other hand, the Asian markets in Singapore, Hong Kong and Japan should be the target markets. However, Indian exporters are unable to compete with Taiwan Province of China in these markets. Furthermore, India's fresh litchi exports are not made consistently to any particular country, indicating that no concerted effort has been made to develop the market. Exports have so far been on an "on and off" basis.

### **International prices**

The litchi prices in every market vary widely from month to month, depending upon the county of origin (Cebeco, 2001).

### **Export grades and standards**

Although there are no official grades or standards, importers normally prefer large fruit with small seeds and bright red-coloured skin. An important requirement is the uniformity of size and weight of fruits.

Each importing country has its own norms for the quality parameters, but the generally acceptable quality parameters in the international market are as shown in Table 1. A distinction is also made between those varieties of litchi that leak juice when the skin is broken and those that retain the juice within the flesh. The latter are called "dry and clean" and are more highly priced.

**Table 1: General commercial requirements for litchi**

<b>Criteria</b>	<b>Requirements</b>
Appearance	Whole, fresh, clean, firm and free of pests, blemishes and mechanical damage
Skin colour and texture	Uniformly cherry-red to pink
Shape	Round and oval-shaped or heart-shaped
Size	Diameter: 25 to 35 mm Length: 25 to 40 mm
Weight	20 g and above
Pulp	At least 75 percent of the weight, juicy, translucent, white matter of pearl colour, sweet with a Brix level of about 17 degree, and should be easily removable from the seed

Different importing countries may also have specific requirements for the chemical and pesticide residues permitted. For example, France is sensitive to use of sulphur dioxide as a colour preservative and has set a tolerance at 10 mg/kg of pulp and 250 mg/kg for skin.

The Codex Standard for litchi (Codex Standard 196–1995) classifies fresh litchi into three classes on the basis of size, weight, shape, colour and skin texture: Extra class (superior quality), Class I (good quality) and Class II (satisfying the minimum requirements). Furthermore, the standard provides provisions for presentation, packaging and labelling (Table 2).



**Table 2: Requirements as per Codex Standard for litchi**

<b>Criteria</b>	<b>Requirements</b>
Size	Diameter Extra class: 33 mm (minimum) Classes I & II: 20 mm (minimum) Size variation in each package: 10 mm (maximum)
Quality tolerance	Extra class: 5 percent by number or weight Classes I & II: 10 percent by number or weight
Size tolerance	10 percent by number or weight in all classes

In addition, the standard also lays down the requirements for presentation (uniform) and packaging, marking and labelling, contaminants (heavy metals, pesticides residue) and hygiene, as per the standards established by Codex Alimentarius Commission.

Keeping in view the present scenario and the growing demand for Indian litchi in the international market, globalization, government economic policies and above all, the expansion in the area of litchi cultivated in the principal litchi growing states of the country, litchi exports from India are poised for a bright future.

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**Case studies of product quality improvement and supply chain management for stone fruit, mango and pomelo in Thailand, the Lao People's Democratic Republic and Viet Nam**

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**Abstract**

*Farmers in Viet Nam, Thailand and the Lao People's Democratic Republic represent about 30 percent of the total population living below the poverty line in Asia. For these poor households, implementation of food safety and good agricultural practices is especially resource demanding and expensive. Compared with developed countries, supply chains in the developing countries are longer and often include many more participants. Many of these supply chain participants are trying to implement new processes to deliver a higher quality product to the consumer. New processes being*

*trialled in the Mekong Delta and mountainous regions of Thailand, the Lao People's Democratic Republic and Viet Nam include: group production practices to improve product quality; investing in elite product lines and implementing new pricing strategies; developing domestic and international trademarks that distinguish their product on quality and food safety; improving product packaging; and, investing in cool storage facilities to maintain product quality. These new processes are designed to meet the consumer demand for higher-quality safe products.*

## **Introduction**

Developing countries play an important role in the world trade of fruit and vegetables. For example, Chile and Mexico account for 53 percent of the world trade in avocados, the Philippines and Brazil account for 62 percent of the world trade in mangoes (FAOSTAT, 2004; Hallam *et al.*, 2004). Exports of fresh fruit and vegetables from the developing countries are increasing, but competition will intensify and profits may decrease.

Within much of East Asia, a dual system of marketing exists; the traditional and the modern. The traditional system is composed of small farms with long supply chains that often include many participants. The average farm size in Viet Nam is 0.66 hectare per household; in Thailand it is 4.51 hectares; and in the Lao People's Democratic Republic the average farm size is 1.62 hectares (FAORAP, 2004; World Bank, 2006; GSO VHLSS, 2003).

Farmers need to grow high value crops to improve their disposable income. In Viet Nam, Thailand and the Lao People's Democratic Republic, peach, plum, mango and pomelo have been grown for many of hundreds of years using traditional farming and marketing systems. In 2004, Thailand produced 174 tonnes of peach and nectarine (George and Nissen, 2005b). For mangoes, Viet Nam produced 337 000 tonnes, Thailand 1 750 000 tonnes and the Lao People's Democratic Republic 3 000 tonnes (FAOSTAT, 2004). Currently, more than 80 percent of the mango, pomelo, peach and plums are produced from small individual village farms in these three countries.

In Viet Nam, most food is still marketed directly by small farmers or through small traders in traditional open wet markets (World Bank, 2006). In Thailand, the Lao People's Democratic Republic and Viet Nam, peach and plum are traditionally harvested before the fruit are fully mature. Fruit are harvested immature to reduce damage from fruit fly. Furthermore, extra firmness is needed to resist breakdown due to poor handling systems.

Many wet markets in Asia lack the necessary hygiene facilities to meet the growing demand for safe product. Producers must be highly adaptable, for inflexible producers will not be able to generate added-value to the supply chain and will be forced out of the industry. Producers must adopt new supply chain strategies that will deliver value for money to their customers and ultimately, the end consumer.

## **Methods and materials**

Studies on the peach, nectarine and plum supply chains in the three countries were undertaken from 1996 to 2006 for the Australian Centre for International Agricultural Research (ACIAR) under the “Adaptation of low-chill temperate fruit to Thailand, Laos, Viet Nam and Australia” project. Further studies of the mango and pomelo supply chains in the Mekong Delta were undertaken from 2005 to 2006 under the Collaboration for Agriculture and Rural Development (CARD) project “Improving Export and Domestic Markets for Vietnamese Fruit through Improved Post-harvest and Supply Chain Management”, funded by the Australian government.

These projects evaluated supply chain effectiveness and efficiency and ways to overcome limitations. They selected champion farmers in production regions, and set up demonstration orchards in villages and research stations. Knowledge and skills were then transferred via consultation workshops, participatory action field days and roving “show and tell” field days. This approach ensured that project objectives and sustainable outputs were achieved to enhance the socio-economic situation of the ethnic minority groups.

Several methods were used to collect baseline data. Relevant data and information on crop production, product quality, market prices, yields, economic, poverty and education levels were collected from the internet and reports produced by the Vietnamese Government Ministries, the Ministry of Agriculture and Rural Development (MARD), the Thailand Department of Agriculture, the Royal Project Foundation, Australian Government Overseas Aid (AusAID), Australian Government Department of Foreign Affairs and Trade (DFAT), the Food and Agriculture Organization of the United Nations (FAO) and the World Trade Organization (WTO).

Survey sheets were developed and tested to obtain information on the effectiveness and efficiency of supply chains. Once adjustments had been made to survey sheets, a full investigation via interviews of farmers, wholesalers and collectors was undertaken by the authors. Farmer survey supply chain information was split into four major components and further divided into subcomponents to facilitate collection of accurate information. These major components were: preharvest, post-harvest, sale of fruit and price and market information. Baseline surveys and interviews with over 150 farmers, 30 collector agents, 20 wholesalers or traders and 20 retailers (international and domestic) were undertaken for peach, plum, nectarine, mango and pomelo.

## **Results**

### **Matching varieties to the environment and markets**

Many supply chains in Thailand, the Lao People’s Democratic Republic and Viet Nam are longer and often include many more participants, compared with supply chains in developed countries. They may have up to ten participants.

To meet changing customers wants and needs, local farmers must improve their fruit quality. To begin with, it is essential to match the varieties farmers are growing to the environment and to their customers’ wants and needs. Production systems that have

high yields, produce high quality fruit and are environmentally sustainable are needed if farmers are to remain economically viable. Furthermore, the supply chain must maintain product quality and food safety.

For example, local peach and plum cultivars were originally selected from high-chill varieties in the People's Republic of China that are not well suited to the low-chill environments in which they are now growing. These poor quality varieties are losing market share to imported varieties from other countries, namely the People's Republic of China, Chile, and the United States of America. The local varieties are slender and ovate in shape, have a large pointed tip and suture bulge, green skin and flesh colour. Fruit are harvested in an immature state to eliminate fruit fly damage and facilitate transport to market. These fruit are considered by the customer as being less attractive when compared to the rounder, highly coloured, imported fruit. For example, in 2004, the Vietnamese H'Mong peach averaged 140 grams in size and received on average US\$0.22 per kg when compared to the highly attractive imported Chinese peach that averaged 200 grams and received a premium price in the Hanoi markets of US\$7.31 per kg.

Fruit quality and yields of locally selected varieties have decreased due to limited inputs and poor management regimes. For example, in Viet Nam, the average yield of a 5-year old, well-managed Tam Hoa plum tree is 80 kg per tree per annum. However, by 12 years of age and older, the average yield has dropped to about 20 kg per tree per annum. This reduction is due to low inputs of water, fertilizer, no pest control measures and poor management practices such as pruning and tree training, causing fruit quality to decrease dramatically. The average market price for Tam Hoa plum has dropped from US\$0.28 per kg in 1981 to US\$0.07 per kg in 2003. This price drop, coupled with low yield, has severely affected the viability of plum farms in Viet Nam.

Carefully selected varieties were introduced as part of an ACIAR project. These varieties were matched to the growing environment and the market. They had lower chilling requirements, producing fruit that were highly attractive, highly coloured, had higher sugar levels, better shape and matured during March to June. Marketing peach, plum and nectarine during this time provided the farmer with a competitive advantage. This advantage was due to the inability of other countries to produce peach, nectarine and plum at the same time. For example, prices received in Thailand for locally produced peach are very low (US\$0.63 per kg), compared with the introduced varieties that average US\$2.73 per kg. In the Lao People's Democratic Republic, introduced varieties have lifted farmer incomes from less than US\$235 per annum to between US\$4,680 and US\$6,240 per annum.

### **Asian supply chains**

Most farms are family-based and have established local personal relationships with collector agents, wholesalers and market agents. These relationships are not well structured and have failed to deliver benefits to any of the supply chain participants. Cooperative farming and coordination to access distant markets to purchase, process and sell products were even less developed.

***Viet Nam***

As compared with state-controlled farms, Viet Nam has now recognized the positive impact of commercial agricultural farms on the living standards of the rural poor; their income, employment, more favourable working conditions; the environment, and the ability to supply products suited to their target markets (Anh and Sakata, 2006). In the past, state farms were large, but now individual farms average just 0.66 hectare per household (GSO VHLSS, 2003). Most farmers have little knowledge of farming practices or marketing their product to national or international markets. Twenty seven percent of farms in Viet Nam grow perennial crops and are concentrated in mountainous regions where there is a lack of transport, infrastructure and unstable markets. They often grow many types of crops together in a mixed farming system. This system usually makes produce unsaleable due to the use of unregistered chemicals and spray drift for pest and disease control (Nissen, 2006a). Mixed farming systems were devised to spread risk and provide subsistence for farmers and their families (Anh and Sakata, 2006).

The AusAID CARD Project in the Mekong Delta worked with both mango and pomelo farmers. This project found that most mango farmers have large trees. Due to their large size, about 30 percent of the fruit is not capable of being harvested. Excessive tree size also compounds problems with fruit quality due to difficulties in harvesting and controlling pests and diseases. Trees are usually strip picked and fruit sold locally to collectors. Mango growers and collectors prefer to sell mixed grades of fruit, even though the farm gate price is very low (Nissen *et al.*, 2006b). Farmers view low grade fruit as a way of obtaining greater profits. As mangoes pass along the supply chain, they are graded by the collector agent then subsequently regraded by the trader and the wholesaler.

The project found that pomelo farmers regularly prune their trees to remove branches that show signs of greening disease, but knowledge on safe chemical usage was limited, causing concerns for food safety. Farmers are unaware of the quality requirements for chemical residues. Pomelo farmers sell approximately 15 percent of their fruit to a Vietnamese trading company and 85 percent to local collectors.

The majority of pomelo farmers share information, but many do not know the current price in the wholesale market. There is no readily available transparent information flows for both mango and pomelo on market price, volume and required fruit quality. Prices found in newspapers and quoted on the television are considered as reference prices only as they are considerably higher than those obtained by the farmer.

Prices vary during the year according to the variety and the volume of fruit marketed. For example, in 2006, prices for the highly prized mango variety *Cat Hoa Loc* ranged from US\$1.84 in the off-season to US\$1.12 per kg during the main production period (Nissen *et al.*, 2006c).

Many Vietnamese farmers believe that volume equals profit. The practice of selling low grade fruit is carried out at the local market level. This low grade fruit could not be sold if fruit were graded and sold to high-value markets. The AusAID CARD project found

that collector agents were not very selective in terms of fruit quality and offered a lower price compared to traders or companies that had quality standards.

Several Vietnamese trading companies have implemented quality and grade standards and offer a higher price to those farmers who can produce fruit that match their standards. Farmers who sold their fruit to Ho Chi Minh City wholesalers must grade their fruit and provide their own transport. About 90 percent of pomelo farmers leave the packaging to collector agents. Due to the robustness of the pomelo fruit, many farmers and collector agents believe that only 2 percent of fruit is damaged during transport to market, which is in 50 to 60 kg bamboo baskets.

### ***Farmer groups in Viet Nam***

Grower groups that have been formed are trying to obtain greater benefits for their members by obtaining higher returns. In the Mekong Delta, approximately 67 percent of the rural population is uneducated (GSO VHLSS, 2003). Whilst encouraging small farmers to form collaborative marketing groups has created greater economies of scale and reduced the number of participants in the supply chain, the benefits to individual farmers in the group appear to be tightly linked to education levels. Those with higher education levels appear to be better able to understand problems and to apply new technology to solve those problems. Other less educated farmers appear reluctant to change and favour traditional methods (Rankin, 2003).

For example, one group of mango growers with which the CARD project is working has implemented a new packaging system, improved the harvesting method, developed grade standards, and are in the process of developing an audit system to record fertilizer and chemical usage. All of these measures being implemented are to reassure their customers that their product is safe and of higher quality. They have integrated vertically by forming their own marketing company and assumed the role of collector agent and market agent. This group has successfully developed a trademark for their product with help from Vietnamese research institutes.

These improvements have come at a significant cost to the group. The costs of introducing these improvements can be 41 percent per hectare greater than the standard traditional practice (George and Nissen, 2004). While a seven-fold increase in net returns for Vietnamese farmers can be achieved through improving the production system (Nissen *et al.*, 2006a), by forming farmers into groups, even greater benefits can be achieved by increasing their bargaining power. However, while there has been a significant improvement in mango fruit quality, for example, a 10 percent increase in Class 1 fruit, farmers have not been rewarded by an increase in the farm gate price. In 2005, the average farm gate price during the peak production season was US\$0.70 per kg and for early season fruit US\$2.12 per kg (Nissen *et al.*, 2006c).

### ***Thailand***

In Thailand, the ACIAR stone fruit project focused on farmer and train-the-trainer training by setting up demonstration sites in conjunction with the Thai Department of Agriculture. Sites were initially set up on research stations and then expanded to include individual village farm plots. This approach was taken because local villagers lack the skills, knowledge and monetary resources to develop orchards and supply chains. The

Royal Project Foundation also assisted with research and development of these sites and helped implement quality control measures and financed the investment in infrastructure, packing equipment and materials, cool rooms and transport systems to enable high quality product to reach target markets (George and Nissen, 2005a; George and Nissen, 2006). The private marketing arm of the Royal Project Foundation, Doi Kham, provided the linkages between each site and the market (Nissen *et al.*, 2006b).

The process of developing a highly successfully supply chain has shown that both government and private investment is needed. This project is now being expanded to assist individual farmers and the formation of larger farmer groups at the village level.

### ***Farmer groups in Thailand***

At the hill tribe village Ban Kon in northern Thailand, a group of farmers has been trying to form a cooperative to grow peaches and nectarine, with mentoring and assistance from World Vision. Severe difficulties have been experienced by this group. The selection of champions to provide leadership was difficult to implement. Group members are not highly educated and lacked knowledge on how to analyse the situation and solve problems. Analysis and problem solving skills are essential for development of new production systems and supply chains, especially if they are to identify key achievable goals to assist the group to move forward from their present position. This position was a state of complete reliance on traditional varieties and orchard management systems, and a marketing system where they were exploited by collector agents due to a lack of market information and infrastructure. They received low prices for poor quality fruit, which caused the group to evolve and change.

Many local farmers grow the local plum variety Julie. This variety is very small, has very high acidity and has good yields, but very poor consumer acceptance. They also produced other local varieties of plum that are highly acidic. Fruit were not allowed to mature and were harvested in a green state. This was done to eliminate fruit breaking down from fruit fly. In 2004, local farmers received from US\$0.09 to US\$0.25 per kg for this variety at the regional markets. With the introduction of new peach and nectarine varieties and hill tribe farmer training in orchard management, they now receive six times more than the highest price for the local plum variety. In 2006, the farm gate price for the introduced peach variety Tropic Beauty averaged US\$1.56 per kg.

Even although the Ban Kon village group has made significant progress they still have a long way to go to produce high-quality extra grade fruit and develop a sustainable supply chain. At present, local collector agents have greater bargaining power. The captive producers are unable to develop their own supply chain due to a lack of quality assurance, infrastructure, a reliable transport system and limited marketing knowledge.

Farm sizes in these mountainous regions of Thailand are well below the national average of 5.6 hectares. ACIAR project studies have shown that net returns for introduced peach varieties in Thailand are US\$18 086 to 32 708 per hectare, at least seven times greater than upland rice.



### ***The Lao People's Democratic Republic***

In the Lao People's Democratic Republic, we selected champion farmers. The ACIAR project team then implemented best production strategies to develop demonstration sites in Xieng Khouang Province. New varieties were introduced and chemicals and fertilizer supplied. Site selection was based on environmental suitability for production, lack of competition and ease of getting the product to market. The demonstration sites were established to show that, with assistance, improved income and reduced environmental degradation could be accomplished. The major problem that the project encountered was the reluctance of the growers to thin their trees. Many farmers are very happy with returns for small fruit. Each tree had in excess of 1 000 fruit and farmers were receiving on average US\$0.78 per kg at the farm gate.

### **Discussion**

Many individual farmers in Thailand, the Lao People's Democratic Republic and Viet Nam feel they are still discriminated against, because they do not have detailed records that validate the market requirements for fruit quality and food safety issues. A few champion small-scale farmers are now marketing their fruit and developing their own supply chains. For example, in Thailand, a few growers produce 30 percent of their crop in the extra grade and 70 percent in Grade 1 categories. These are equal to or better than some imported product. In 2006, they received an average price of US\$2.35 per kg for their fruit (George and Nissen, 2006). These small-scale farmers still find it extremely difficult to implement quality control measures due to a lack of resources for grading and packaging, transport and handling, as well as knowledge on developing and maintaining a recording system for food safety.

Many traditional farmers do not grade their fruit because they believe that long-term relationships with collector agents provide significant benefits. These long-term relationships between farmers and collector agents have led farmers to believe that the collector agent will not reject any of the farmer's fruit, pay the farmer a higher price and the collector agent will provide low-cost transportation to the market (Nissen *et al.*, 2006b). Many small farmers sell directly to small traders in traditional open wet markets that lack necessary hygienic facilities. These supply chains are usually very fragmented and short, and wholesalers buying from the collector agents often control information on supply and demand (World Bank, 2006; Moustier *et al.*, 2003).

Changes are now taking place in Thailand and Viet Nam with large supermarkets and exporters playing a decisive role in defining how fruit is to be graded and marketed. At the grower level, smallholder production is now being replaced by large commercial units (farmer groups) or large individual contract growers. Project discussions with large supermarkets, have verified the trend to integrate chains with fewer players. These are being developed to enhance product traceability, compliance with good agricultural practices, hazard analysis and critical control point systems, which are not legally mandatory, but imposed by the buyer (Hallam *et al.*, 2004). Observations and information obtained on product specifications confirm that during times of high volumes, large supermarket and distribution enterprises enforce product specifications, but in times of product scarcity, product specifications are not strictly enforced. For example, the average mango price for the variety Cat Hoa Loc special grade in January

is US\$1.84 per kg. Fruit size in this grade can vary by about 100 grams or more and blemish marks are more apparent. However, in April, the average mango prices for special grade is US\$0.98 per kg, size grades have less variability and blemish marks are virtually non-existent.

On average, in Thailand and Viet Nam, production input costs usually account for 40 to 60 percent of the gross returns. With the implementation of new grading and packaging systems, a further 40 percent could be easily added to those costs (Nissen *et al.*, 2006c; George and Nissen, 2004). Implementing greater quality assurance standards will cause production and marketing costs to rise substantially. Without a significant increase in returns, implementation of high quality assurance standards will make it uneconomical for many individual growers to continue farming. Economies of scale and the cost of organizing efficient and effective supply chains with a limited number of players tend to mitigate against small-scale producers and exporters (Hallam *et al.*, 2004).

### Conclusions

There has been a proliferation in the number of food safety standards imposed by global retailers, trading blocks and private companies. These standards have structural difficulties and create bias against certain groups of exporters and producers (Hallam *et al.*, 2004; Aksoy and Beghin, 2005). In Thailand, the Lao People's Democratic Republic and Viet Nam, individual small farmers are at a distinct disadvantage. This is due to overproduction of poor quality fruit and marketing systems that do not adequately compensate farmers for producing high quality fruit. Many farmers and supply chain participants lack market intelligence, infrastructure and logistical knowledge to ensure fruit are safely handled to maintain product quality. Furthermore, many individual farmers appear to be unable to capture the benefits of producing high quality fruit, as the present marketing system and supply chains have many more participants compared to developed countries. Many supply chains are very long. Due to these factors, prices appear to be set at the lowest level in the supply chain by the collector agent (Nissen *et al.*, 2006b).

The three countries all suffer to varying degrees from instability in the fruit production sector. Compounding this instability is sequestered market information. Full disclosure is not practiced by each participant in the supply chain. This is carried out so suppliers can obtain a competitive advantage over other suppliers.

A critical element in setting up a successful supply chain is demonstrating benefits to the supply chain participants and the need to form groups to achieve better economies of scale and increased bargaining power. Work has to be conducted at both ends of the chain, the producer and the final customer. This work has to be executed simultaneously, as neglecting either end of the chain limits the ability of the producer to supply a product suited to the target market.

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## **Initiatives and issues in fresh fruit and vegetable supply chains in India**

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### **Abstract**

*The organized retailing of fresh fruit and vegetables is highly evolved in many developing countries such as Kenya, Brazil and the People's Republic of China. In comparison, organized retail chains in fresh fruit and vegetables are relatively new in India, where fresh produce is marketed largely through traditional channels. However, this situation is changing very rapidly with the entry of prominent industrial groups such as Reliance, ITC, Godrej, Tata and the Aditya Birla Group. Based on interviews with corporate managers, organized fresh fruit and vegetable marketing systems can be categorized as: (1) developing retail outlets in metropolitan and business hubs in the rural areas for procurement of produce and selling fast movable consumer goods and agricultural inputs to farmers; (2) catering to the supermarkets by developing organized wholesalers; and (3) developing chains for export of fresh fruit and vegetables. Apart from these three models, fresh fruit and vegetable marketing may occur through cooperatives and state agencies. In-depth interviews with various stakeholders suggest that some of the key issues emerging are: the lack of farmers' awareness of post-harvest management; the lack of common grades and standards; failure to comply with the Agricultural Produce Marketing Committee Act for procurement from farmers; lack of trained manpower in the area of post-harvest management; enforcement of contracts between farmers and corporations; the lack of cold chain infrastructure; and competition from traders in the traditional market. These issues need to be addressed to facilitate the more efficient operation of fresh fruit and vegetable supply chains. These new initiatives are likely to bring about a great deal of dynamism in the traditional market by emphasizing quality issues, focusing on post-harvest management and market extension, the availability of quality inputs and formal credit for the farmers, and greater transparency in transactions in the current system.*

### **Introduction**

Organized retailing is a very recent phenomenon in India compared with other developing countries. By some estimates, organized retailing in India is about 4 percent of the total retail segment. However, the AT Kearney Global Retail Development Index, pegs the national average at 6 percent (AT Kearney, 2006). Organized retail market share averages in other Asian countries like the People's Republic of China and Viet Nam are much higher at 20 percent and 22 percent respectively. In South Africa, Brazil

and the United States of America, the figures touch 32 percent, 75 percent and 82 percent respectively.

Despite the slow start, the supermarket revolution in India is spreading at a phenomenal pace. According to the AT Kearney study, India tops the list of most attractive countries for international retail expansion. Every day, the press reports plans for new investment in the retail sector by a major Indian firm. According to the India Retail Report, the top ten players in the modern retail trade are likely to invest US\$18–20 billion in the next five years to generate as much as US\$50–60 billion in revenue by 2011. This investment will be made in the top 150 cities, although the impact will be visible in at least the top 500 if not more (Technopak Consulting Group, 2006).

Several Indian conglomerates are entering the retail foray. While 100 percent foreign direct investment (FDI) in retailing is not currently permitted in India, international giants are entering the market as joint venture partners with Indian firms. Reliance Industries and Bharti-Walmart are two of the biggest players. Other major players include ITC, Food World (JV of RPG Group of India and Dairy Farm International based in Hong Kong), Spencer, Godrej, Pantaloon (Big Bazaar and Food Bazaar), and Subhiksha. Most of the retail action is in the southern states of Andhra Pradesh and Karnataka, followed by other metropolitan centres like Delhi, Mumbai and Kolkata.

The most common retail format in the emerging chains is the neighbourhood store (with 2 000–5 000 sq. feet) focusing on fresh fruit and vegetables (FFV) and other food items. Other bigger formats such as supermarkets and hypermarkets also exist, but are much fewer in number. Because of the focus on FFV and food items, retail chains are making significant investments in developing supply chains for FFV. Fresh fruit and vegetables are an important category for the retail chains. In marketing terminology, the FFV segment is considered as the “destination category”, implying that FFV purchase brings the consumers into the stores (AC Neilson, 2003).

Supply chains developed by these supermarkets are well coordinated chains: a very different approach to marketing FFV as compared with the fragmented supply chains in the traditional market. Organized retailing in FFV is a new area for the country and there are many challenges in establishing such supply chains. Different models of FFV marketing are emerging given the backgrounds, strengths and interests of the firms.

Given these dramatic changes, it is important to understand the ongoing situation, the major issues and the key success factors in developing supply chains. In a country like India where a large mass of the population is dependent on agriculture, these changes are likely to have a profound impact on the agricultural economy because of the impact on the major stakeholders – farmers, traders and wholesalers in the traditional market. The overall impact of these changes depends on the share of modern value chains in the total FFV market and the extent of participation of small and marginal farmers in these chains. This paper focuses on the technical aspects, the nitty-gritty of setting up FFV supply chains at the ground level.

### Methods and data requirements

The study method is based on the rapid appraisal approach. Emergence of organized retailing in FFV is a very new phenomenon in India. As highlighted by Hu et al. (2002), in a situation where changes are beginning to emerge and published data is not available, rapid appraisal of the situation is an appropriate methodology. A rapid appraisal survey is a broad and preliminary overview of the organization, operation and performance of a food system or components thereof, designed to identify system constraints and opportunities. It can be used as a tool for identifying system dynamics, linkages and overall problems, which can then be examined more intensely during follow-up programmes (Holtzman, 1986). Rapid reconnaissance or rapid appraisal usually involves short periods of time in the field and it combines some elements of a formal survey, key informant interviewing and participant observation.

The data for this study was collected by the authors as rapid reconnaissance surveys of supermarket managers, post-harvest staff, farmers, traders and wholesalers in the traditional market, government officials and other key informants. The survey was conducted from September to November 2006 in all the major cities in India – Bangalore, Hyderabad, Delhi, Kolkata, Mumbai, Pune, Ahmedabad and Ludhiana. Information in leading newspapers and the press was used to substantiate the survey data.

### Current situation of fresh fruit and vegetable marketing in India

The traditional marketing of FFV in India is typical of a developing country. Several studies have estimated the loss of fresh produce due to poor post-harvest handling to be in the range of 30–40 percent of production (Singh *et al.*, 2002). In such a situation, it is important to understand the weaknesses of the current system and to see how modern supply chains can help to overcome these weaknesses.

Fresh produce in India is marketed mostly through regulated Agricultural Produce Marketing Committee (APMC) markets. Agriculture is subject to state intervention in India and, as such, the APMC Act is under the purview of the state government. APMC regulations require that the purchasing of fresh produce takes place in a notified market and with registered traders (commission agents). There are two charges levied on the marketed produce. First is the commission paid to the commission agent and second is the market tax which goes to the market committee as a payment towards using the premises and other capital works related to market development.

Supply chains for FFV tend to be multilayered which has implications for the farmers' share of the final consumer price; the quality of produce due to multiple handling; and for the marketing cost as the various agents add their costs. A typical supply chain for FFV is shown in Figure 1.

**Figure 1: Supply chain for FFV—traditional marketing approach**

**Farmers → Local Traders → Commission agents → Retailers → Consumers**

The local traders are the traders close to the farmers who procure the produce from the farms and bring it to the market. Commission agents are the wholesalers at the APMC market who sell the produce to the retailers. These retailers include roadside and neighbourhood stalls and kiosks and doorstep delivery by hand carts. The last link in the chain is the consumer.

Marketing through traditional means is characterized by very little attention to grading, sorting and storage, weak institutions and poor handling during loading, unloading and transport (Gandhi and Namboodiri, 2006). The high percent of post-harvest damage can largely be explained by such poor handling of the produce.

### **Emerging models in fresh fruit and vegetable supply chains in India**

Different models of FFV supply chains are emerging given the background, strengths and interests of the firms involved. The investment requirements also vary with the choice of forward or backward linkages.

The oldest models of FFV supply chains in India are the cooperative models initiated by the government. The first such initiative was HOPCOMS (Horticulture Producers Cooperative Marketing and Processing Society Limited), started by the Karnataka State Government (Premchander, 2002).

#### **Farm to fork**

As the name implies the “farm to fork” approach is based on investing in the complete chain from the input level to the front end retail. The main components of this model are: (i) rural business hub, (ii) distribution centre, and (iii) retail end.

The rural business hub is essentially a rural mall set up by firms in semi-urban and rural areas. These rural malls serve multiple functions: (i) provide inputs and farm support services including seeds, fertilizers, plant protection chemicals, extension support and other services such as lab testing, water testing, etc; (ii) cater to the rural market by selling fast movable consumer goods (FMCGs), food items and consumer durables to the rural consumers; and (iii) serve as procurement centres for FFV. The rural hubs of different retail firms have different names such as *Choupal Sagar* (ITC) or *Aadhar* (Godrej).

The distribution centre or collection centre is usually located in an urban area close to the stores. FFVs procured from the various rural hubs are collected at the distribution centre where the produce is graded, sorted, packed and sent to the retail outlets. As the retail chains are relatively new, the produce is procured from multiple sources including direct procurement from farmers, regional APMC markets and other preferred suppliers. Overtime, as the supermarkets develop their backend linkages, the tendency will be to source directly from farmers or preferred suppliers because it is difficult to have control over the quality of produce procured from APMC markets.

Finally, the last step in the chain is the retail store in urban areas. Godrej has been on the ground with its retail outlet *Nature's Basket* since 2002, Reliance set up its first set of stores *Reliance Fresh* in Hyderabad in November 2006. ITC's *Choupal Fresh* pilot



ventures were supposed to cater to the wholesalers, but a large number of clients were direct consumers. Their new stores will all be retail stores.

### **Organized wholesaling**

Some firms are specializing and investing in the wholesale sector to be able to supply quality produce to supermarkets, retailers and institutions. Essentially, the investment is focused on procuring, storing and distribution. The major initiatives in wholesaling are *Adani Agri Fresh* and the Germany-based company Metro Cash & Carry. As the government permits 100 percent FDI at the wholesale level, Metro is able to act independently in India.

Although these firms are specializing in wholesaling, their respective models are very different. *Adani Agri Fresh* operations are limited only to FFV. So far they are specializing in apples. They have set up state-of-the-art infrastructure for grading, sorting and cold storing apples in three locations in Himachal Pradesh, one of the main apple producing regions. They procure directly from farmers and store the fruit to capture the off-season demand. Because of their infrastructure, they can ensure the supply of quality apples for most parts of the year. Their main customers are likely to be supermarket chains where the requirement is for year-round supply of quality produce.

The operations of Metro Cash & Carry include wholesaling of all consumer items including food products. FFV is a part of their operations. Currently, they have stores in Bangalore and Hyderabad and plan to open stores in other metropolitan areas including Kolkata.

### **Front end retail stores**

Pantaloon group has several stores in many cities in the country. They have several retail formats for clothes, fashion accessories etc. Their outlets *Food Bazaar* and *Big Bazaar* deal in food items and FFV. FFV is a small part of their overall retail business. Given that their stores are spread across the country and FFV is a small part of their business, Pantaloon has not yet invested in developing direct linkages with farmers. In some cases, they lease out store space to agents who want to run FFV operations. Procurement in this case is likely to be from the local APMC markets and preferred traders.

Another regional convenience store chain is the 3Cs group of Kolkata which plans to expand operations in the eastern region.

### **Export chains**

Exporting with GLOBALGAP certification is a relatively recent phenomenon in India. Two major initiatives on this front are *Namdhari's Fresh* and *Field Fresh*. *Namdhari's Fresh* started with exports, but now they also have retail outlets in India. The parent company of *Namdhari's Fresh* is Namdhari Seeds, which is a renowned seed company in India.

The firms selling with GLOBALGAP certification have to develop very tight chains to meet the certification requirements. Because of their seed operations, Namdhari Seeds has developed strong linkages with farmers over many years. In the case of the Bharti-

Rothschild initiative, they have leased land from the farmers and developed state-of-the-art infrastructure to meet the stringent quality requirements. Both firms have invested in state-of-the-art cold chain infrastructure, packing and grading houses, cold stores and refrigerated trucks, along with highly skilled post-harvest manpower to meet the quality parameters of the importers.

### **Issues in developing supply chains**

Developing fresh fruit and vegetable supply chains is a relatively new phenomenon in India and a very different approach from the fragmented traditional markets. In any new initiative there are bound to be challenges. Several issues were highlighted in the interviews with managers and technical personnel in the supermarkets.

One approach to present the issues would be to present a summary of the issues that emerged in the discussions. Another approach is to discuss the major steps in setting up the chain and analyzing the issues at each step. The latter approach is used because it serves the purpose of reviewing the requirements for setting up a chain, gives a comprehensive understanding of the major issues and provides insights into the steps taken by the supermarkets to overcome these challenges. The main steps in setting up a chain were identified as:

- Step 1: Policy environment (APMC Act)
- Step 2: Developing linkages with farmers
- Step 3: Coordinating with farmers
- Step 4: Procurement
- Step 5: Post-harvest management

#### **Step 1: Policy environment (APMC Act)**

When supermarkets set up supply chains for FFV, they are making huge investments not only in setting up infrastructure at various levels, but also in developing linkages with farmers. To make such investments, there needs to be some level of confidence in the policy environment. The agricultural sector has traditionally been dominated by the government. For increased private sector participation, a fair playing field is a prerequisite.

One of the major hindrances is considered to be the APMC Act (Agricultural Produce Marketing Committee Act). Since the APMC is a state Act, the impact of the Act varies from state to state. The main issues with the APMC Act include restrictions on working within the market premises, which requires the produce to be unloaded and reloaded, leading to a loss of quality because of multiple handling and the time involved. Other factors include delays due to paperwork, paying the market tax and at times paying multiple market taxes when dealing with different APMCs within the state or from other states. Paying the market tax as such is not a major problem; the bigger problem is the time required to complete the formalities. Overall, the impact of the APMC Act ranged from minor frustrations to actually stalling improved FFV operations in some cases, even though investments in infrastructure for distribution centres had already been made. In the recent months, several states have modified the APMC Act to create a

more conducive environment for private sector investment. Nevertheless there are vested interests and in some states the process has been slower than others.

### **Step 2: Developing linkages with farmers**

Developing supply chains in FFV involves a lot of effort to develop linkages with farmers, especially in gaining the trust of the farmers and to motivate them to work with the supermarket. Some instances which emerged in discussion were that “if suited-booted executives show up in the village, it is not easy for the farmer to trust them.” Developing farmer linkages is relatively easier for the firms that have been involved with farmers over time, either through input supply or other means. For example, Godrej has been able to capitalize on the relationships developed with farmers through their input supply and animal feed ventures over many years. ITC also has relationships with farmers through their e-choupal initiative. However, a key difference is that while the e-choupal initiative was in the grain producing regions, the *Choupal Fresh* initiative is in the vegetable growing regions. In these regions, ITC is also working with a USAID team to set up linkages with farmers.

### **Step 3: Coordinating with the farmers**

The three aspects of coordinating with farmers are: (i) developing crop plans; (ii) ensuring availability of required inputs and services for quality produce; and (iii) purchasing from farmers.

When working with farmers in a region it is important to develop crop plans based on the location and traditional strengths of the farmers. An issue which came up in crop planning is that all farmers want to grow higher-value crops such as capsicum instead of tomatoes because of the higher unit price. This problem is usually handled by rotating crops grown by the farmers.

The second issue is of ensuring the availability of inputs. This includes physical inputs as well as extension advice not only on cropping but also harvesting and post-harvest management. The supermarkets usually work with other input suppliers for input supply and credit. Furthermore, supermarkets have done a good job in using agricultural graduates to provide information to farmers. For example, the *Aadhar* centre of Godrej has a soil testing laboratory and a good team of agricultural graduates to provide the required information regarding specific crops.

The final step in coordinating with farmers is the purchase of produce. Three key issues in procuring from farmers are “pole vaulting”, procuring graded produce and the procurement price. “Pole vaulting” or “mushroom buyers” were some phrases we heard while doing the research. Essentially, these are terms used when the farmer sells his or her produce to another buyer and not to the supermarket which has been assisting the farmer to grow the produce. If a buyer shows up willing to pay only Rp 1 higher per kg, the farmer will sell all his produce to that buyer. Some of the ways of handling this were to develop long-term relationships with the farmers. It was found to be helpful to sit with the farmers with a paper and pen and help him or her calculate the costs and returns of dealing with the supermarket. In working with the supermarket, a reduction in costs occurs because of the more targeted use of inputs based on soil testing results. Furthermore, the returns are higher because of the higher yield due to extension advice

on management practices provided by the supermarket's extension specialists. The overall calculation helps them to see the benefits of working with the supermarket in the long run.

Another important issue in coordinating with farmers is that of buying graded produce. The supermarkets buy graded produce, which causes two problems for the farmers: (1) the farmer is still dependent on the local trader to sell the rest of his crop; and (2) in selling all his produce to the local trader, he would get a higher average price. The supermarket takes the high quality produce (about 30 percent of total production), for which he gets a higher price. However, the price he gets for the rest of the produce is lower than average. Over time, as the amount of quality produce increases, this issue will become less important. Furthermore, as some supermarkets are diversifying into processing, potentially, they can buy all of the produce and use different quality produce to satisfy different market needs.

Finally, setting the price was the most important issue in procuring from the farmers. Based on our experience, the best option was to link the price to the market price. Setting the price before growing the produce did not seem to work very well because, for the farmer, the best alternate price is the market price at the time of selling the produce.

#### **Step 4: Procurement**

A good retail store for fresh produce needs to have a sufficient number of stock keeping units and a supply of quality produce in the stores at all times. The main challenges are going out of stock, empty shelves and "sleeping vegetables" (a term used for vegetables which are not very fresh). Since the supermarkets are dealing with small groups of farmers in remote locations, it is seldom possible for them to meet all their FFV requirements through direct sourcing from farmers. The variety of FFV required is large and produce is grown in different parts of the country. Hence, supermarkets are still relying on the traditional APMC market. They have ties with agents in the APMC market who ensure that they get the required variety of FFV for their stores. However, it is difficult to assure quality from the APMC market because there is no control over the production at the farm level. In discussing the supermarket procurement strategies overtime, Reardon *et al.* (2003) indicate that supermarkets usually have to develop procurement systems parallel to and outside of the traditional markets to meet their quality requirements.

#### **Step 5: Post-harvest management**

Three important aspects of post-harvest management are quality standards (grades, pesticide residue), post-harvest infrastructure and manpower. So far as quality and standards are concerned, there is a lack of standards and grades for fresh produce in India. The supermarkets establishing supply chains for FFV are setting up their own grades and standards and communicating these to the farmers working with them. In other countries of the world, where government grades and standards exist, the retail sector still has to invest in setting up their own quality standards because their quality requirements are higher than the government standards. Thus, in setting up supply chains in FFV, developing quality norms and communicating these standards to the farmers is crucial.

Post-harvest infrastructure refers to infrastructure for packing, grading, storage, transportation at the collection centre and at the retail outlet. In our survey of the retail chains in India, we found supply chains with varying levels of sophistication ranging from low-investment infrastructure to state-of-the-art cold chains. In the low-investment chain, the distribution centre is simply an open space for grading, sorting and packaging. Common trucks are used for transportation and the retail outlets also do not have refrigeration for the produce. On the other hand, the high-investment chains include sophisticated distribution centres, highly skilled manpower for grading and sorting, reefer trucks and refrigeration at the retail outlets.

The low investment could very well signify the first phase in the evolution of more-sophisticated supply chains. ITC, for example, is tied up with Ingersoll Rand, a consulting firm specializing in technological innovation to provide cold chain technology. So far as refrigerated trucks are concerned, the size of trucks in India is small and it is not economically viable. The high import duty for imported trucks is an issue which needs to be addressed.

Finally, from discussions with technical experts at the ground level, it was evident that there is not enough manpower in the country to manage post-harvest issues adequately. Training in post-harvest management has not received much attention in the past and needs to be addressed immediately. More importance on post-harvest management should be incorporated into extension programmes to enable farmers to meet the requirements of the supermarkets.

### Conclusion

It is evident that the modern value chains developed by the retail sector are a welcome change from the traditional marketing approach. After years of putting numbers and percentages on post-harvest losses, for the first time, some concrete investments are being made to minimize these losses. Some key areas for the government to encourage their efforts include:

- **Providing a conducive environment for private sector investment.** Modifying the APMC Act will go a long way towards encouraging private sector investment. Several state governments have achieved a great deal of success on this front, but more effort is required.
- **Setting standards for FFV.** In other countries where organized retailing is widely prevalent, the retailers have set up their own FFV standards that are higher than the government standards. It is very important for the private sector to meet quality requirements to be competitive in the new food law regime. The government needs to work with the private sector to develop standards for quality and food safety.
- **Post-harvest management, farmers, skilled manpower and infrastructure.** Historically, post-harvest management has not been given much attention in government extension programmes. In a changing market, post-harvest management needs to be an important part of the government extension programmes if farmers are to participate in modern value chains and to meet the quality requirements of the

supermarkets. From the field surveys, the shortage of post-harvest manpower emerged as a crucial issue. In the coming years, this issue is going to be critical and needs to be addressed immediately. Finally, the supermarkets are investing in post-harvest infrastructure. Incentives for investing, for example, through lower import tax for reefer trucks, will encourage more investment in this area.

- **Developing linkages between small farmers and the retail sector.** The government sector, donor groups and non-governmental organizations can facilitate the development of linkages between small farmers and supermarkets. It is important to initiate projects with public–private partnerships that encourage the involvement of small farmers in modern value chains by providing training in post-harvest management and by collaborating on input supply and credit. The supermarkets are at the stage where they are setting up farmer linkages which are likely to continue in the long run. Initiating such projects will ensure the participation of small farmers in modern value chains.

Finally, the changes brought about by the retail revolution are likely to have far-reaching implications for the stakeholders in this sector including farmers, wholesalers and traders in the traditional market, as well as small retailers. The extent of the impact will depend on the share of organized retail in FFV marketing and the involvement of small and marginal farmers in these modern value chains.

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## **Demand trends and their impact on supply chain innovation<sup>6</sup>**

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### **Abstract**

*Consumers are unrelenting task masters. They want it all – products with lower prices, more convenience, better taste, good for their health, good for their appearance and what is more, cause no harm to the environment and are sustainably produced. Consumers, however, are not one homogenous group and increasingly, retailers are acknowledging this through their tiering of supermarket own-labelled fresh food products, viz. **good** (retail parlance for cheap), **better** (regular), and **best** (premium). Emulating the blue chip fast moving consumer goods (FMCG) firms (e.g. Unilever, Nestlé), the challenge is to identify key consumer segments in these target markets and to identify what each segment most values and is willing to pay for. This requires a high degree of customer understanding that has not been evident in the past, where most fresh produce suppliers had little idea of whether a few shoppers bought a lot or a lot of shoppers bought a few. Research evidence clearly indicates that companies or organizations that work closely with their suppliers and customers are financially more successful than those that don't. This is particularly the case for fresh foods whereby the innovation task is a shared supply chain responsibility for each and all actors in the chain. A seed company can breed premium taste, but this attribute has no consumer value unless growers produce it optimally, and distributors and retailers provide the degree of supply chain excellence and integrity that ensures it reaches the shopper in prime condition.*

### **Introduction**

Modern retailing is characterized by the ubiquitous supermarket, whereas traditional retailing embraces the “wet market” and corner “mom and pop” stores. Now, which one of these retailers knows most about his or her customer? Who knows the most about their product? The traditional retailer is unlikely to know where the original product came from, if it was imported (i.e. not local) and he or she probably wouldn't care. What is the point about that? It concerns me when I think that modern retailing, which has done a fabulous job overall, has focused on supply chain development, on efficiency, on reducing costs and streamlining, but failed to understand the shoppers' needs adequately. I would suggest, particularly for fresh produce, where an individual deals every day with the same customers, they amass an immense knowledge about what that particular customer needs. This is my general thesis, an analogy, an evolution. It strikes me that in the fresh produce industry we are emerging from the swamp. We are just dragging ourselves out of the primordial goo and often, even for relatively sophisticated fresh produce distributors and indeed for retailers, they are often unaware

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<sup>6</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management



of who their specific customers are. They are still working out, “Do a few buy a lot?” or “Do a lot of shoppers buy a few?” They know how much they sell in a week, but in terms of drilling down, to “Who buys what?” they are only just becoming aware.

From a fresh produce distributor’s point of view, we are still working out who our competitors are. We tend to think that if you are in, say, the United Kingdom and if you are in the berry business, the competition is the Netherlands or Belgium, and not other fruits, or indeed Del Monte or Cape Pineapple in a convenient pack: this is the competition.

We are in this strange world in the fresh produce industry where often the price is highest when the quality is lowest and vice-versa. You know what I mean? When is the price highest in many importing countries? When the fruit is out of season. When is the quality lowest? When the fruit is out of season. When is the product bursting with flavour? During the main harvest period when we quite literally give it away.

Frequently quality and availability are inconsistent. One thing about the Cayenne pineapple to which Denis Loeillet referred to was its consistency: it was consistently acidic; it was consistently unripe. It was consistently difficult to prepare, and yet, on a regular basis, we put it out there and then looked disappointed if it didn’t sell. Well, thank the Lord that the super sweet version came on! Even more, thank the Lord that someone took that rather awkward skin off it, because if our product doesn’t meet the consumers’ aspirations on taste and on lifestyle, then price isn’t an issue – they won’t buy at any price if it’s rubbish!

Product development, as I look around the industry, is often focussed on agronomic and supply chain benefits, you know, extending shelf life. That was the great thing. How far can we extend the shelf life so we can get that disappointing flavour to last even longer? Or on packaging or reducing varieties to lower unit cost – well, what about consumers? Where are the consumer benefits? Picking up on some marketing principles – delivering the right product, the right time and the right place, I think we have often got the wrong product in the wrong form at the wrong price in the wrong location. Clearly we have to learn from world class competitors. We have got to work out who they are and they are probably not in our industry. What food marketing is all about is trying to work out what people value and are willing to pay for. Now that is tough. I travel a lot. I was in Hong Kong recently and there on the shelf I found a square watermelon. Now, that’s useful; well, maybe if you want square watermelon sandwiches! I am pleased that somebody put a lot of time and effort into that, and it was selling for a modest US\$180. Bargain! Moving away from fresh produce, I was working in Seoul the other day and what did I see on the retail meat shelf? – a cow’s foot, and what’s more, a really nice one. It was priced at a modest US\$80. Isn’t it interesting how value varies by country? In the UK, a cow’s foot is a cost to the meat industry and has no consumer value.

The real challenge in the fresh produce industry, particularly if we are export orientated, is to work out what people do value and are willing to pay for, because demand isn’t unidimensional. In fact, it is the reverse: I think it’s bipolar. As you know, clearly we are in a global world. In the United Kingdom, you can buy a Chinese Fuji apple any day of the week. Now, three years ago that wouldn’t have been the case. So, is it all about

globalization? Well, interestingly, and thank the Lord, for fresh produce, there is an increasing demand for local: “I want to buy the local one and I want to pay a premium for doing so.” If customers want to pay more, you shouldn’t disappoint them.

We work, often to many peoples’ surprise, in a high-tech industry, but also in what can be best described as a high touch industry. We want to deal with people who understand what they are selling and are willing to give us the story associated with what we buy. This is the downfall of modern supermarkets where it is a real challenge to find anybody in the store who knows anything about the product; thus the advantage for traditional retailers and also for emerging new independent retailers. Is demand strongest for new and improved products? Well, traditional products increasingly attract the attention of consumers yearning for past taste experiences.

What about ready-to-eat? This is a real challenge in the food industry in many countries. We want it now. But, we want it natural and unprocessed. Do you see the tensions here? Big companies like McDonalds have had to respond from the basic burger offer to fresh sandwiches made in front of you.

Is it all about fast food? Well, not in some countries, and increasingly, too, there is a slow food element. During the week, I want it now and I want it fast and I want it on the run. But during the weekend, I want to sit down with my family and friends and enjoy the food, and when I am in that mood, I want to know more about it. Where was it produced? Who produced it? What is the story associated with it? Is there any romance?

Is it just me or friends and family? Again, we have got to come to terms with consumer demographics. In the United Kingdom, just under one third of all households are one person. Don’t even speculate what they do in the evening. Whatever they do, they do it by themselves. These individuals don’t have a lot of need for a watermelon or a pineapple.

Is it all about low price? If you listen to the retailers you get a sense that it is, because it’s all about, “Price, price, price and let’s get the price down, down, down”, but there are two clear areas of growth in most markets. One is the very low priced – in Tesco language, the value end – and the other is the premium priced product, in Tesco language, the finest end. As producers, we have to work out which ones we shall target, or in most cases, which products have we got for the finest and which for the value? This is great news for fresh produce, because, with modern retailing, the focus is on all-year availability. I’m in the berry business and 365 days a year you need that product on the shelf. In the developed country markets, we are starting to regain interest in seasonality. As you wander around the supermarkets of the world, you can hear people saying, “When is it at its very best? When do you get the real new potatoes? When will it be just bursting with flavour?” and that presents us with great opportunities.

Is it all about scale? Well, to a degree, but then also, in Europe it is about small scale and artisan or craft production. I think we are moving from open supply chains – back to the supply chain theme of the conference – towards closed supply chains where there is a known provider of genetics through a seed, selling to possibly a club of farmers, to maybe an exclusive retailer, through to known shoppers and consumers.

What do consumers want from their food and drink products apart from low prices? We want low prices. Sometimes we want astonishingly low prices, but we want more. In some markets, but not all markets, consumers have the latitude to be able to pay more for more. In the United Kingdom, we see increasing interest in environmentally friendly products. Was this product produced in an environmentally friendly way? Do I have to feel guilty about buying it? What about its impact on global warming? What about the reduction of food miles? Actually, I think fresh fruit is under pressure here. My wife, for example is uncomfortable buying berries air-flown from Chile to the United Kingdom. I do think it will have a commercial impact. When I'm working in say, New Zealand, I am saying, "I bet fresh chilled New Zealand fish will not be air-flown to British markets by 2010." There will be sufficient consumer concern about it by then. Consumers will be saying, "No, let's grow the fish at home." Mind you, food miles, *per se*, is a rough and ready, often inaccurate way of measuring environmental impacts. Increasingly, our measures will become more sophisticated like "carbon footprint" measures.

There are other esoteric attributes of food, these so-called credence attributes like "environmentally friendly". What about sustainability? I call it the Schlosser effect after Eric Schlosser. Some of you might have read *Fast Food Nation*. What is its GMO (genetically modified organism) status? If I were talking to a meat conference we would be concerned about animal welfare and fair-trade. There is a growing body of consumers who are concerned about this, and I am afraid that the bar is going up. What we don't want to see is intensive production practices that harm the environment. (With reference to an aerial photograph.) On the left-hand side is a part of southern Spain in 1974, and 30 years later this is the same part of southern Spain in 2004. Look at the white bit on the right. Do you know what it is? This is an area where we get winter vegetables and fruit, from Spain for Northern European markets. It's plastic. In a little over 30 years we have managed to take several thousand kilometers and completely carpet it in plastic. I can see consumers saying, "We don't like that. That can't be right. Can you imagine how much pesticide we pour onto that concentrated area of land?" We are moving away from this level of intensity and this sort of interest in the environment is just growing and growing and growing. What I see are mainline retailers in a number of countries starting to use their credentials on the environment and on other credence areas like animal welfare, fair-trade and food miles, to position themselves in different parts of the market.

For example, Waitrose is a small niche retailer in the United Kingdom with about 4 percent market share; pretty small, although it does better in fresh produce. With regards to its fresh produce, domestically and increasingly internationally, it wants to have its growers accredited under LEAF, Linking the Environment and Farming. This is environmentally friendly fresh produce. Let's take Marks & Spencer – an up-market retailer just like Waitrose – they want the brand Marks & Spencer to stand for all the good things about the environment, about sustainability, about low residues, about treatment of animals, etc. They don't want little labels identifying this. They want me as a shopper to know that when I buy from Marks & Spencer, it's guilt-free and it's good for the environment.

I am associated with a company called KG Fruits which is a farmer-owned berry company in the United Kingdom. Last season, one of our farmers was taken to task by one of the major television channels, because it was found that the grower had underpaid two of his foreign workers who had come into the United Kingdom to pick strawberries. It was headline news. Unfortunately, he was supplying strawberries through us to Marks & Spencer. The very next morning we had the chairman of Marks & Spencer on the phone to us saying, “That’s it; this is your last chance. If this happens again, if there is any adverse publicity about your treatment of suppliers, then we will de-list you.” This is serious stuff and, in the high income markets, the bar on environmental and social sustainability will go up and up and up, and have an impact on everybody here who is importing to that market.

Is it just in the United Kingdom? No. If I look at an emerging and very successful natural food retailer in the United States of America, Whole Foods, they are doing exactly the same. There is a whole story linking the food to where it came from. “The folks behind the food, Kudu farms nestling in the beautiful Carp Valley” da-da-da-da-da “is grown by” and so associating the farmer with the retailer. That is the sort of powerful imagery for consumers and shoppers.

What about consumers’ concerns about food production practices? This is important. Apart from low prices, what else do they think about? Let’s go into northern Europe in 2020 – when the consumer will shake hands with the citizen. Remember, that you can be a consumer and you want cheap, good-tasting food and as a citizen, say, you are somebody who is concerned about global warming. I think they will be one and the same by 2020. You have got to watch out in our business for special interest groups. If you take complete lunatics who don’t want to be influenced by anyone, they have a particular agenda, an environmental agenda and they want to drive that. We in the industry have to listen to these special interest groups, particularly the ones who are willing to listen to us, and see what their story is. As we become more aware of climate change I think it will just heighten consumer concerns about the environment. How was food grown and what is its impact on global warming? Some governments – for example, my own in the United Kingdom – are intent on raising the bar on environmental sustainability. European farmers are slow, but they are not stupid; they have suddenly become aware of the implications of food miles. Five years ago they didn’t know what food miles were. Now they see it as a great opportunity to stop product coming into Europe, so it has become a “non-tariff barrier” and they will push that agenda.

Leading-edge retailers are seeking to gain competitive advantages from their green positioning. For mainline manufacturers, CSR, which is corporate social responsibility, is moving up the agenda. I was working two weeks ago in Switzerland with Nestlé. If we take their new product which is called Nespresso, then it is a completely closed supply chain, from working as they are – the largest food manufacturer in the world – to working with small-scale coffee growers in Latin America and taking it all the way to the point of consumption. So, even the big companies are getting into it.

Organic market potential: I think as we see this sort of move towards increasing concern about the environment, Marks & Spencer are saying to us that “by 2008 we want you to

be residue free”. The minute that happens and it will, then all the competitors will ask for the same and the bar will go up and the gap between organic and conventional will get smaller and smaller. Is there a market for organic? Certainly, but it is starting to look more and more like conventional products.

What about GMO developments? Well, Europeans are still much concerned about it, but I think their concerns will reduce over time, particularly, for example, as they notice that GM has a positive impact on the production of, say, energy crops, rather than food crops. GM corn can be converted into energy. Furthermore, the environmental case for GM will strengthen over time as we become more aware of drought intolerance and the lack of water. How can we increase production levels at a time when water supplies are going down? For major exporting countries and firms and for the industry overall, you can't have a leadership position in the market by saying, “We are number two in food chain integrity or we are number two in environmental responsibility.” That is just not possible.

What sort of value chains should we have? Value chains are all about consumer pull, rather than producer push. We know what sort of value chains we want. We want short, fast, transparent, seamless, collaborative ones. Too often, they are complex, price-driven, confrontational, disjointed and opaque. Times are changing from supply push to demand pull. We are moving from an era where one size fits all, from where the Cayenne pineapple suited everybody – actually, it suited nobody – and we are moving from a commodity market environment to a consumer segment environment. There are millions of us out there as consumers and we are not all the same. I see the research and development focus shifting from this great push on input traits like increasing yields and disease resistance to consumer-led output traits such as taste, size and shape and health benefits. This is what it should be about, but it will move from open access supply chains to more closed loop supply chains, where there is a known genetics provider, where there are clubs of farms, where there may be an exclusive retailer, and a group segment of consumers who particularly want a particular product and are willing to pay a premium for it.

We are moving from price-based competition to a more sustainable innovation-based competition, and it's not just innovation in products. It is also innovation in value chains, innovations in processes, innovations in finance. Whereas promotion means “price cutting”, promotion will mean “product benefiting, communicating”. When retailers talk about promotion, it means price reduction. As a supplier, you are never quite sure whether you should say “Yippee!” or cry when you are told your product is going on promotion. I think we are moving from promotion means price-cutting to promotion means explaining-the-particular-benefit-of-our-product-to-a-particular-segment-of-consumers. Let's hope the profit driven by squeezing supplier margins moves towards profit from category growth. Good retailers already understand that. We are in an era not of dependence, but of interdependence where we link arms in the supply chain and all the research that you can get hold of that looks at this area shows that those who work closely with their suppliers and with their customers are financially more successful than those who don't.



# **SUPPLY CHAIN MANAGEMENT**





## **Business-to-business relationships in parallel vegetable supply chains of Ho Chi Minh City (Viet Nam): reaching for better performance**

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### **Abstract**

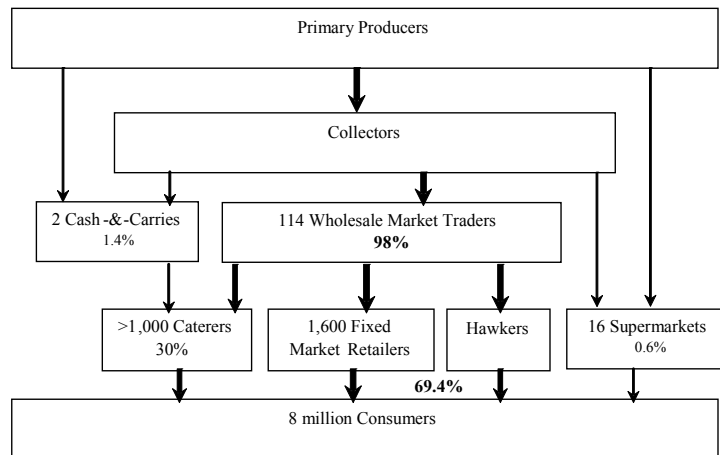
*This paper synthesizes research findings on supply chain arrangements and mechanisms in the business-to-business relationships encountered in supply chains distributing fresh vegetables to Ho Chi Minh City. Eleven months were spent in the field from July 2003 to May 2004 to conduct in-depth interviews with stakeholders in the chain. The links between important elements of good supply chain management practice and performance are illustrated by concrete examples from in-depth case studies. The positive impacts on performance of the following elements of business-to-business relationships are reviewed: long-term commitment, coordination and joint planning, market orientation and information sharing, frequency of communication, and innovation. The results show that parallel vegetable supply chains differ in their structure and in the existence or lack of formal links (contracts) between business partners. However, the five elements of good supply chain management practice which are reviewed can be identified at varying degrees in all supply chains as strategies to achieve higher levels of performance. This research shows how all stakeholders in the fresh produce marketing channels – from small farmers and rural collectors to an urban Cash & Carry outlet and its customers in the catering industry – strive to reach a common goal of better performance. It also uncovers the existence of several hybrid forms of economic organization in the local vegetable industry.*

## Introduction

Different components of the vegetable marketing system to Ho Chi Minh City (HCMC) have been described in previous publications, all derived from the same research project implemented in partnership between CIRAD, Nong Lam University and Imperial College London.

The first article set the Vietnamese vegetable marketing system in its regional context: it emphasized the importance of the institutional, food trading, historical, geographical and cultural environments in shaping the structure of the local supply chains and the marketing relationships between stakeholders (Cadilhon *et al.*, 2003). A second article described the details of the tomato marketing system to HCMC (Cadilhon *et al.*, 2006c): it compared the performance and market share of traditional and modern marketing chains competing to supply tomatoes to eight million city consumers (Figure 1).

**Figure 1: Market share of competing HCMC supply chains for tomatoes**



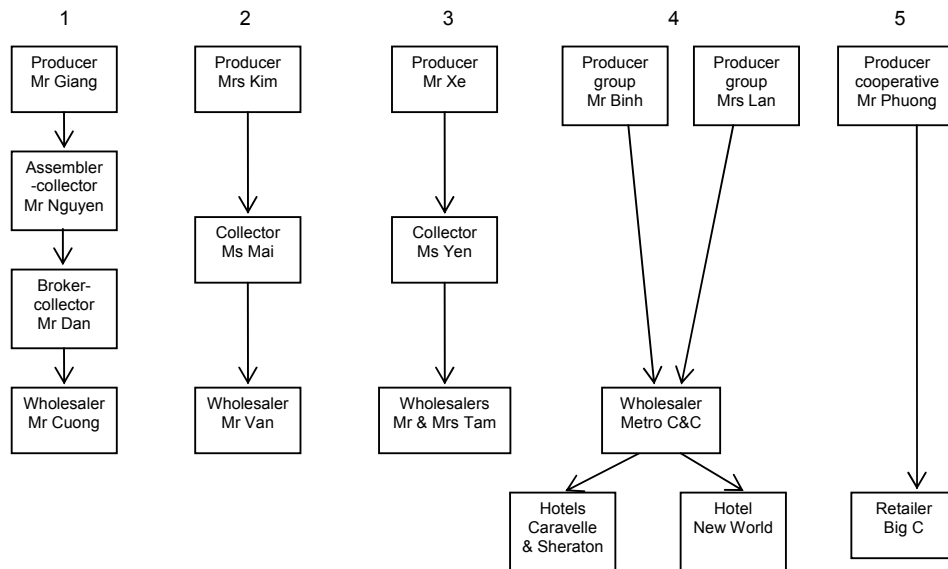
Source: Cadilhon *et al.* (2006c)

A third publication gave our insights on the mixed impacts of supermarket development on the sustainability of the vegetable production and marketing system in Viet Nam (Cadilhon *et al.*, 2006a). Finally, a series of shorter articles presented the detailed case studies of some of the individual traditional and modern vegetable supply chains that had been investigated during this research project (Cadilhon and Fearne, 2005; Cadilhon *et al.*, 2005; 2006b). All these publications are available upon request from the authors. Figure 2 shows the five independent supply chains investigated.

Supply chain 1 is representative of the traditional vegetable distribution channel from Lam Dong Province to HCMC. The tomatoes in this supply chain are sold by the producer to an assembler-collector who grades the produce but relies on a second broker-collector to find wholesale customers in city markets, gather enough produce for transport to the city on a big truck, and organize the transport logistics. A wholesaler in HCMC then sells the tomatoes to secondary wholesalers and retailers. Supply chains 2 and 3 distribute respectively butterhead lettuce and tomatoes. They are also emblematic

of the traditional marketing channels leading to the city wholesaler. Yet, collaboration and exchange of information between stakeholders within these supply chains are facilitated by the fact that there is only one collector between producers and wholesalers. Supply chains 4 and 5 lead to the modern distribution system. Supply chain 4 consists of Metro Cash & Carry and its network of tomato suppliers in the rural area of Lam Dong Province; these suppliers are mainly producer groups. The Cash & Carry business is determined to improve its customer portfolio of HCMC five-star hotels. It therefore endeavours to satisfy the needs of these special customers. Supply chain 5 is a direct marketing link between a farmers' cooperative in Da Lat supplying vegetables to Big C Supermarket in HCMC.

**Figure 2: Five vegetable supply chains investigated**



Sources: Cadilhon and Fearné (2005); Cadilhon *et al.* (2005; 2006a; 2006b)

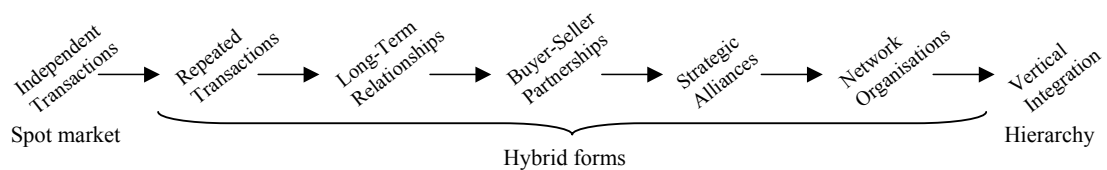
What is still missing is a conceptual framework to create the link between the individual supply chains and the marketing system as a whole. The objective of this article is to present a conceptual framework derived from marketing relationship research. We then show how this model is used to integrate the findings already reported in our previous publications into the characterization of the different business-to-business (B2B) relationships that coexist in the vegetable marketing system to HCMC.

The following section will review the literature for definitions of the key components of B2B relationships. After briefly describing the research methodology, we will show how all the intermediary B2B relationships existing between independent transactions and vertical integration can be identified in this context of food commodity markets in a developing country. The findings will demonstrate how all the supply chains identified strive to increase their level of performance. The final section will draw conclusions from the results and direct recommendations to policy-makers and entrepreneurs involved in developing food marketing systems in the developing countries.

### Key components to unveil the business-to-business relationship continuum

All the intermediate marketing arrangements between spot markets and firm integration, which are called hybrid forms by Williamson (1991) and acknowledged as a stable form of governance structure, have only more recently become the focus of research for transaction costs economists (Brousseau and Glachant, 2002; Ménard, 2004). On the other hand, marketing and business management research has been traditionally focused on identifying these various hybrid forms and, in line with transaction cost economics, considered the distribution of information along the chain as the core of its analyses. Webster (1992) defined a marketing continuum which took into account the various intermediate forms of interfirm relationship arrangements. Each position on the continuum builds upon the position to its left. Independent transactions are the closest to the spot market model where buyers have no prior intention of purchasing from the same seller again. The emphasis of this relationship is on low prices. Repeated transactions require at least one previous exchange which can start a learning process in both buyer and seller, leading to regular patronage (Figure 3).

**Figure 3: Webster's range of marketing relationships**



Source: Webster (1992)

Long-term relationships involve a long-term commitment from both parties in the transaction which may nonetheless coexist with some adversarial behaviour such as comparing prices with competing suppliers or customers in the market. Commitment is a multi-dimensional construct. It reflects the fact that either stakeholder of a marketing dyad believes in and accepts the stated goals of the channel relationship. Both firms also show a willingness to exert effort on behalf of the other partner and a strong desire to maintain the relationship (Mohr and Nevin, 1990). Commitment has often been coupled with a long-term orientation, i.e. the attitudes and perspectives of the relationship stakeholders are focused towards the long term as opposed to lengthening the duration of the relationship (Lusch and Brown, 1996).

Buyer-seller partnerships represent a state of interdependence with market-oriented common goals, cooperation, joint planning and trust, leading to mutual benefits. Market orientation has been defined as the active search for, generation of, dissemination of, and reaction to market information on customers, competitors and environmental forces in order to satisfy the needs of the final customer in a supply chain to the benefit of supply chain stakeholders (Elg, 2002). Cooperation has been defined as “similar or complementary coordinated actions taken by firms in interdependent relationships to achieve mutual outcomes or singular outcomes with expected reciprocation over time” (Anderson and Narus, 1984, p. 45). Joint planning is part of cooperation and specifically addresses the actions decided by both firms together (Claro *et al.*, 2003). Market

orientation of firms has been directly linked by past empirical research to information sharing (Sanzo *et al.*, 2003). Rather than keeping information to themselves, market-oriented firms in successful partnerships exchange information so as to customize their activities better to those of their partners and to the needs of the final consumer. To be efficacious, information sharing should be meaningful and timely (Dyer and Ouchi, 1993).

A strategic alliance is formed when two firms are ready to commit resources in time and investment into the partnership to bring further benefit for both. Network organizations are formed when firms simultaneously engage in several relationships, partnerships and strategic alliances. Finally, the ultimate marketing relationship is vertical integration of all activities into one firm (Fontenot and Wilson, 1997).

A final key component of successful relationship marketing is innovation. Product innovation is the creation of value in a form that can be perceived by the consumer. It is a determinant factor of successful supply chains as innovation prevents the product from being commoditized and thus losing value (Desbarats, 1999).

The research presented in this article means to characterize the B2B relationships in competing vegetable supply chains in HCMC by utilizing Webster's range of marketing relationships and the key components of successful B2B relationships.

### **Research methodology**

The tomato and butterhead lettuce supply chains were selected as case studies because of the widespread use of these vegetables by consumers and the problems in marketing and transport identified by previous research (IFPRI, 2002). Data was collected in HCMC between 2002 and 2004. The principal method of data collection was in-depth interviews with marketing system stakeholders – farmers, collectors, wholesalers and supermarket managers – followed by five case studies: three case studies of traditional supply chains and case studies of the modern tomato supply chains of Metro Cash & Carry and Big C supermarket.

A survey of HCMC wholesale traders was also implemented to understand the working conditions at the wholesale level of the traditional supply chains. A detailed questionnaire was used to interview 53 tomato wholesalers and 44 butterhead lettuce wholesalers (respectively 46 and 37 percent of all traders of their respective commodity enumerated at the time of survey in the three principal wholesale markets of the city). Finally, insights into the functioning of the food marketing system in HCMC were collected by key informant interviews with government officials, local researchers and industry experts.

Performance indicators to compare the different supply chains within the marketing system were elaborated so as to cover market share, satisfaction of stakeholders, prices, margins, a labour index and supply chain efficiency (Cadilhon *et al.*, 2006a; Cadilhon *et al.*, 2006c). However, the in-depth interviews showed that indicators of better performance would be very subjective. Depending on the stakeholder interviewed, "better performance" could be increased sales, increased market share, lower levels of

waste, supply of better-quality produce, better risk management, shorter delivery time, better reactivity to changing market demand, greater satisfaction from the business relationship, etc. The links between the elements of good supply chain management practice and performance will now be illustrated by examples from the case studies.

## **Results**

### **The impact of long-term commitment**

In-depth interviews uncovered some evidence of an indirect impact of long-term commitment on levels of waste and increased sales. Firstly, the stakeholders interviewed in supply chains number 2 and 3 identified the positive impact of long-term commitment on building a good interfirm relationship. Interviewees also linked good business relationships to performance, so there is evidence for an indirect link between long-term commitment of business partners and performance through the fostering of good B2B relationships. The case studies also revealed that long-term commitment and the successful interfirm relationships that resulted from it allowed supply chain stakeholders to manage risk more successfully given the uncertain context of produce marketing in Viet Nam.

Second, in supply chain number 5, which led to the Big C supermarket, the long-term commitment of the supplier, Mr Phuong, to his relationship with Big C, has had a direct positive impact on his willingness to be flexible to the needs of Big C. Mr Phuong's long-term commitment has also led to his great satisfaction about his business relationship with Big C. In both modern distribution channels (cases 4 and 5), the contract signed between suppliers on the one hand and the supermarket and cash-and-carry businesses on the other, are considered by the suppliers as the tangible proof of the long-term commitment between the two parties signing the supply contract. This finding thus backs previous research emphasizing the more important role of trust and information transparency in successful B2B relationships, with contracts providing only tangible proof of the business relationship, rather than its founding rules (Roxenhall and Ghauri, 2004). What is more, the incomplete nature of these supply contracts (Brousseau and Fares, 1998) also leads to automatic negotiations between partners when market conditions vary or conflict arises. These incomplete contracts can be seen as a more flexible and thus more efficient contracting solution in the context of strong uncertainty to environmental conditions and behaviours of business partners that is endemic in Viet Nam. Indeed, no occurrence of using the judicial system to enforce the supply contract was reported by either Metro or Big C. This could be explained by the lower cost of the self-enforcement of disciplinary action by the distributor compared with litigation.

The important finding concerning long-term commitment in vegetable marketing channels to HCMC is that it is a fundamental component of a B2B relationship in this particular context. Despite the multitude of supplier or customer alternatives, the majority of traders prefer to be committed to their regular business partners because of the high switching barriers and the difficulty and time needed to build trust between traders. This leads to the surprising case of Ms Mai, in supply chain number 2, who keeps a long-term commitment with her customer Mr Van, although she voices some dissatisfaction about this marketing relationship.

### **The impact of coordination and joint planning**

According to the lettuce wholesaler Mr Van and Metro vegetable buyers, supply chain coordination in the form of advanced planning of sales and orders leads to higher quantities sold, better quality produce, and a good reputation among customers for the end business of the supply chain. However, this forward planning has a mixed impact on the rapidity of the chain to supply the order. In the traditional lettuce supply chain leading to Mr Van, forward planning of sales is done five days before the delivery. On the other hand, the modern supply chain leading to Metro can provide the same quality produce with only 24 hours' notice. Thus, in terms of time between order and delivery, the modern supply chains to Metro are faster in distributing quality produce than their direct competitors leading to the traditional markets. However, the quantities involved are much smaller in the modern distribution channels, making it easier to manage fast logistics. What is more, because of the more advanced ordering, Mr Van has to take the risk of frequent market fluctuations impacting on his profits between the time of ordering and effective delivery.

A joint agreement on prices prior to sale was directly linked to greater satisfaction of business partners in both the traditional and modern supply chains. When the joint agreement on prices was backed by a deposit, as implemented by Ms Mai with her butterhead lettuce farmer-suppliers, the level of supplier satisfaction increased as did the level of trust towards the farmers: Ms Mai could trust that farmers would not sell their harvest to another collector after they had agreed to keep it for her.

### **The impact of market orientation, information sharing and communication**

Case study findings show that stakeholders in the two shorter traditional supply chains 2 and 3 have stronger market orientation than those in the longer supply chain number 1. In these market-oriented supply chains, customers will actively search for potential suppliers, rather than relying on potential suppliers coming to them to sell their produce. Actively looking for suppliers has a direct impact on the better quality of the product delivered by carefully chosen suppliers, as witnessed in the cases of the supply chains leading to the wholesalers Mr Van and the Tam couple, but also in the case of the modern supply chains.

Finally, market orientation of firms has been identified by both traditional traders and vegetable buyers in the modern distribution sector as being very important because it helped predict future market conditions in order to plan orders and sales activities. This in turn had a positive impact on performance through the reduction in levels of waste after grading and leftovers.

The positive impact of both market orientation and information sharing on increasing the levels of consumer satisfaction can be witnessed in the case of tomato supply chain stakeholders sharing information to prevent farmers sowing a second crop of a new variety of tomatoes that had not satisfied traders and HCMC consumers because of its short shelf-life. Sharing information enabled supply chain stakeholders to react to market information and distribute produce that was more appropriate to the consumer demand.

Sharing more information has been directly linked to increased levels of satisfaction about the relationship by both the Big C supermarket and its supplier Mr Phuong of the farmers' cooperative. Similarly, low levels of information sharing led to low levels of satisfaction as epitomized by the case of Mr Giang, the dependent tomato producer in supply chain 1 who does not get any market information whatsoever from his dedicated customer.

Information sharing has also been linked to better coordination by the stakeholders interviewed. In both traditional and modern supply chains, information sharing about prices, quality requirements and plans for promotion, led to better coordination and joint planning between stakeholders.

Finally, sharing information has also been linked to increased levels of trust among supply chain stakeholders, although the more refined component of information transparency has generally been quoted by the traders interviewed to determine trust. Information transparency has been defined as the subjective perception of an individual of being informed about the relevant actions and properties of the other party in the interaction (Eggert and Helm, 2003). All the stakeholders interviewed supported the role of transparency on prices, activities and general market information in facilitating the development of trust in their relationships with both individuals and organizations. For example, more transparency between traders involved in the traditional supply chains led to easier joint resolution of conflict. Furthermore, being transparent on the different grades of product and their respective value had a direct impact on increasing profits for both farmers and collectors, as both had a joint-interest in harvesting and selling more of the better-quality product which would be sold for higher prices.

Likewise, being transparent on the grading of produce and the different price premiums that these grades may get for both farmers and collectors had a strong impact on increasing producer satisfaction as shown by the case of Mr Xe and his tomato collector Ms Yen in supply chain 3, who assessed the potential value of the harvest together. When farmers were not made aware of these price differentials, but had to rely on other channels of information to get this information, or when farmers were not present at the grading stage to establish the value of harvest, the level of satisfaction decreased, as was the case of the dependent tomato producer Mr Giang.

Our research identified that enhanced levels of communication could come either in more frequent communication or in the use of a greater variety of modes of communication. Indeed, the positive impact of frequent communication in fostering good business relationships was voiced by traders in the two shorter traditional supply chains 2 and 3. Moreover, frequent communication had a positive impact on joint conflict resolution in the relationships between Messrs Cuong and Dan in the longer traditional tomato supply chain. Finally, the case studies of the modern supply chains, which show better levels of performance measured by waste levels for the final customer, can point to the positive impact of frequent communication between suppliers and customers on lowering levels of waste and increasing the quality of the produce through more efficient sorting.



### **The impact of innovation**

Mr Binh and Mrs Lan, both suppliers of Metro, and Mr Phuong, the manager of the farmers' cooperative distributing through Big C supermarket, voiced the importance of innovation in maintaining good levels of performance. The innovation these three stakeholders implemented comes not only from the focus on quality in order to satisfy their demanding customers, but also their organization of the producers into an association of farmers for Mr Binh and Mrs Lan, or an official cooperative for farmers working with Mr Phuong.

The organization of farmers into bigger groups has enabled the three stakeholders in charge of the marketing activity for the farmers' groups to increase the quantities sold and to sign supply contracts with big customers. Furthermore, establishing a formal cooperative enabled the farmers working with Mr Phuong to sell some produce, including tomatoes, free of value-added tax in application of a new law regulating farmers' cooperatives in Viet Nam.

However, the results from the case studies have also shown other positive impacts from the capacity to innovate. The capacity to innovate can be linked to increased market share: the example of Mrs Lan and her farmers' association is representative of this. Thanks to their focus on producing a large array of quality produce specifically designed to satisfy the orders of Metro Cash & Carry, Mrs Lan and her group of farmers have effectively captured the bulk of Da Lat vegetable supplies to Metro. Their market share to Metro has increased to surpass the quantities delivered by other longer-lasting Metro suppliers. Moreover, the capacity to introduce new methods of harvesting and packaging had a positive impact on fostering good business relationships as shown by the case of the farmer Mrs Kim and the collector Mrs Mai in the traditional lettuce supply chain.

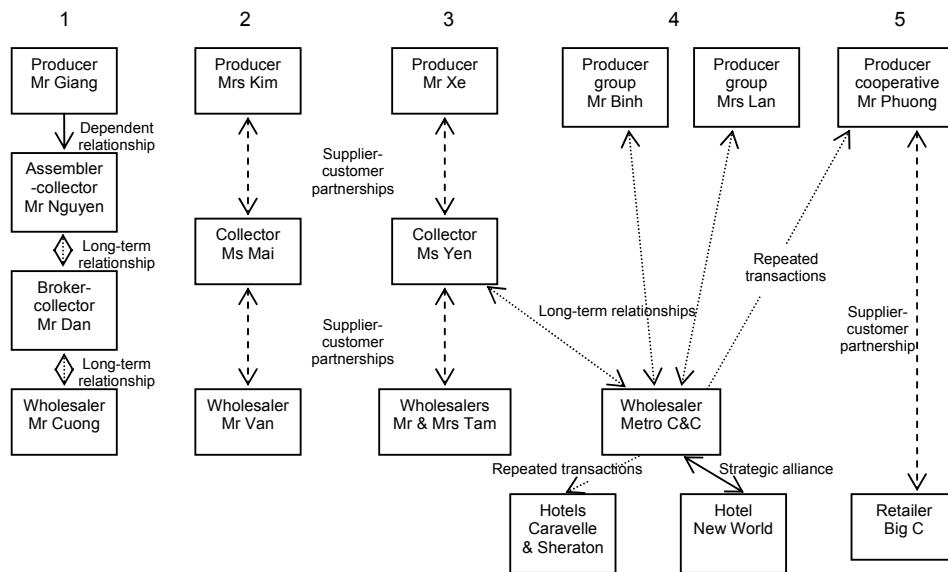
Finally, there are specific positive impacts on performance brought by an innovative focus on quality. The quality-focus of farmers had a direct impact on improving their trading conditions with collectors. For example, Mr Xe always sold his entire tomato harvest at the beginning of the season to his regular collector, Ms Yen, which meant he had found a secure outlet for his harvest, thus diminishing his risk. Likewise, the lettuce producer, Mrs Kim, had a very strong bargaining position with her regular collector, Ms Mai, as the latter had to follow her pricing decisions. The same relationship was true between Metro and its suppliers. The very good quality of the produce sold by Mrs Lan and Ms Yen to Metro enabled them to achieve higher prices than their direct competitors or successfully to resist demands to lower prices for a promotion period, as demonstrated by the case of Ms Yen.

The focus on quality enabled suppliers to be less prone to the coercive use of power by their customers. This was exemplified by the case of Ms Yen in her successful negotiations on promotion prices with Metro. Likewise, Ms Yen's tomato producer Mr Xe had also benefited from less abuse of power by his regular collector thanks to his special focus on good quality produce.

## Conclusions and discussion

The results reported here and in our previous publications show that Webster's range of marketing relationships is an adequate model to characterize the B2B relationships present in the vegetable marketing system in HCMC, as shown in Figure 4. It is worth noting that all the hybrid forms between spot market and hierarchy have been uncovered as Metro has created a real network of suppliers. Likewise, some traditional collectors deal with a portfolio of customers. Webster's model enables all the individual supplier-customer relationships studied in competing vegetable supply chains to form a coherent description of the various subsets of the vegetable marketing system.

**Figure 4: Characterization of B2B relationships in the vegetable marketing system to HCMC**



Sources: Cadilhon and Fearné (2005); Cadilhon *et al.* (2005; 2006b; 2006c)

The principal result from this research is the identification that relationship marketing is the dominant form of economic organization in the vegetable marketing system in HCMC, even in the traditional wholesale market. The supply strategies of modern distributors and of some traditional traders who specialize in the supply of quality foods (for such customers as restaurants, schools and quality shops) have added some innovations to the practices witnessed in the traditional channels: formal contracts, joint conflict resolution and quality focus. The loose nature of these contracts also enables both supplier and customer to decide quickly whether or not to transact with each other given the prevailing market conditions. Such incomplete contracts may be a solution for agribusiness companies wanting to devise supply strategies in developing countries while escaping the high occurrence of renegeing on strict contractual arrangements in the fresh produce sector.

Vertical supply chains act as a channel for market information between city customers and their rural suppliers. Stakeholders also use their involvement in marketing channels as a strategy to reduce marketing risks.

All the supply chains investigated – whether traditional or modern – strive to achieve better levels of performance, although the indicator used by each individual to measure performance may be relatively subjective.

These findings lead to strong policy and business recommendations. First, there is a need for a paradigm shift among policy makers and their advisers to acknowledge the importance of relationship marketing in the traditional food marketing systems. This paradigm shift will lead to a better understanding of the determinant role that the private sector plays in managing the food distribution system and therefore diminish engrained wariness of public-private partnerships and private sector-led marketing initiatives.

Despite recent efforts to develop the capacity of farmers, there is still need for increased extension efforts towards producers in order to develop their business and technical skills, notably in the field of safe production techniques and quality management. Most of the innovative farmers identified by this research were “asset-rich” in terms of human and financial assets (Reardon and Timmer, in press). Thus, government support to group farmers in order to achieve a better focus on quality and customization of activities would be useful.

Collecting and disseminating such success stories of good B2B relationships and the lessons learned from these examples to policy makers, traders and farmers should be encouraged. Indeed, sharing this information can only be beneficial to all stakeholders in the food marketing systems of developing countries.

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## Supply chain coordination in a traditional wholesale market<sup>7</sup>

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### Abstract

*Mercer Mooney is a “traditional” fresh produce wholesaler that has constantly evolved over time. The role of a good wholesale trader is to predict market trends accurately and ensure the company and its people are well positioned to be actively involved in the change and not to become a victim of it. The supply base continues to consolidate, requiring alliances to be built with large national supply organizations while at the same time maintaining relationships with small, high-quality producers. In fruit production, there is typically an inverse relationship between the size of a farm and the quality of the produce. Large-scale plantings are relatively new to Australia and are largely driven by managed investment schemes. The production from these farms puts a large volume of fruit of various quality onto the market. The challenge large operations have in managing their fruit crop is to find enough suitably trained staff to manage and harvest the crop. While machinery overcomes this problem for large-scale vegetable production, it is seldom available for most fruit crops. In contrast, the majority of small owner-operators produce excellent quality fruit, but such requires a higher level of management. Growers with consistent high-quality produce are always highly valued. However relationships with large corporate producers must be balanced in the supply equation. The customer base for Mercer Mooney is diverse and includes national supermarket chains, high-quality independently owned stores, food service outlets and secondary wholesalers. Servicing Western Australia’s supermarkets represents just over 30 percent of the business. While this is valued business, Mercer Mooney is not dependent on their trade for survival. Servicing these customers requires high levels of quality assurance, supply planning, logistics and business management. Servicing the independent stores requires attention to detail and developing a good relationship with individual buyers. Whilst having a good relationship is critical, sales to this market are still made on a day-by-day basis. The company now employs quality managers, business managers and logistics managers to deal with the changing requirements of these groups effectively. Successful wholesaling requires a good balance between small- and large-scale suppliers and a diverse mix of customers to provide the best marketing option for a given consignment of fruit. In this instance, Mercer Mooney is able to market a producer’s entire crop at the best price, not just a particular portion of it.*

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<sup>7</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management

## **Introduction**

Good morning. I have two roles this morning. Firstly I want to give you a brief background into fresh produce marketing in Western Australia through the eyes of a wholesaler and then I want to talk a little about our business as it currently operates.

Historically, central marketing in Western Australia has traditionally been done by auction. In those days, the producers would bring all their produce into the market, the retailers would wander around and inspect it, decide what they wanted, and then the auction would start and people would place their bids. This was quite a lengthy process and quite restrictive. There was no sort of placing orders or anything like that. Typically, about 80 percent of the business was done through the auction system, with private treaty, which is sale by negotiation, accounting for 10 to 15 percent of the business. Slowly, over time, that began to change as retailers wanted a bit more customer service. They wanted to be able to put in orders. They wanted to have a guaranteed supply, and so, by the late 1980s or early 1990s, we had the last auction for fresh produce in Western Australia.

When we talk about traditional wholesaling, to be in business today, you have to move with the times. People who stuck to what they were doing then are no longer with us. Just a quick family history: our company started in 1915 with my great-grandfather Benjamin Mercer. His three sons got involved. My great-cousins and all my uncles and father became involved. Everyone bought each other out and on and on it went until the present day.

## **Wholesale marketing of fresh produce in Perth**

We operate today at the Canning Vale site in Perth, Western Australia. This is a purpose-built facility constructed by the State Government in 1989 and is the most modern wholesale market in Australia. Basically, there is a central trading area. Surrounding this is a covered area where the retailers park their trucks. On the central trading floor, produce comes in from the growers. The retailers have a look at it, face it, discuss it, negotiate a price, put their order in (if they haven't done so already the night before), and then the produce is divided up and delivered to the retailers' truck. From here it goes back to the shop. Around the perimeter are the warehouses where we store the produce. In one of these warehouses we have a separate refrigerated area from where we conduct our supermarket business.

Mercer Mooney is a little bit unusual in that we handle quite a range of produce. We do tropical fruit, stone fruit, apples, citrus, berries, mushrooms, and all the vegetable lines. Typically you will find that wholesalers will tend to specialize in a certain area. The way our business is structured, we actually have businesses within the business, so even although we cover a broad range, the people selling each particular line, for example, citrus, have been doing that for the last 10 to 15 years and are specialists in their area. This is probably something that is a bit unique. We also have a packing facility where we do pre-packed produce, mostly for the supermarkets. Again, we have a large number of prepacked lines, but we only pack a small volume for each of those lines. Our system is set up to be flexible: we can change over very quickly. In Europe, while large pack

houses have invested heavily in specialized machinery, we don't do the volumes that are necessary to recover the investment. Consequently, our labour costs are high.

### **The supply base**

Basically, Western Australia is characterized by a large number of small-to-medium-sized family owned farms. Labour is very expensive and families supply their own labour for the great proportion of the year and then bring in labour for harvesting. The minimum wage is AU\$13.47, but if you're not paying AU\$18 an hour at the moment, you won't get anyone to turn up. So, labour is a very high-cost input. We deal with several large national marketing cooperatives, which are organizations that consolidate the produce from these small-to-medium-sized farms. A good example is Australian Fresh Mangoes. How we deal with them is to manage their market sales. While they tend to go direct into the supermarkets, we still manage the logistics for them. We do the quality inspections, get the load ready, and manage the logistics into the store. A lot of people ask why we help them, because essentially they are a competitor. However, we do it because we make money. We charge a fee per unit. Secondly, if we don't do it, somebody else will. But the third reason we work with them is because we get all of the information about what they are doing and that is particularly valuable to us. We get a national picture on what is going on and who is doing what.

On the supply side, the newest emerging factor is the large managed investment schemes that operate in Australia. This is quite new and we are not quite sure how that is going to shape up yet. For example, the Rewards Group in the last three years have put 800 hectares of irrigated horticulture under production. In Australia, with a population of just 21 million, that will have a very significant impact and they are not alone.

In terms of how we deal with our suppliers, we operate on both commission sales and net farm gate pricing. We tend to have suppliers with whom we have established a long-term partnership. In these instances, we will get involved with supply planning, what varieties they are planning, when to pick, how long to store, and what to pack into. Because we operate on commission, the higher we sell it for, the more money we make, so there is a very strong incentive to do the right thing here. We also work with what we call a grower or trader category in which case we get some growers who will ring us, then ring the competition to see who has the best price on the day. If there is an opportunity to do business, we will, but if not, we won't. So, we have quite a different style of business for those two categories.

The thing that keeps us honest is that information is very, very easy to obtain and it is very open. However, there is a temporal dimension. Because we deal daily with the supermarkets, the exporters, the retailers and the secondary wholesalers, at any point in time, we should have the best knowledge of what is going on and can provide the best advice with that in mind. Within a week or so, everybody else will also have that knowledge and thus it is very easy to see if we have given the right advice or not and if we have done our job properly. Consequently, there is a great deal of pressure.



### **The customer base**

Our customer base has a large influence on how we do things. About six years ago I had the great privilege to listen to Professor David Hughes talking on vertically integrated supply chains. At that stage I wasn't working for the business. I listened to this talk and it was very informative. I just couldn't see where a wholesaler would fit into the picture in the three to four years. So, with a heavy heart, I trudged home and told my dad: "It's great all the effort you put into the business for the last 30 years, but I'm sorry things are changing and we are not going to be in business in the next two to three years."

He said, "Really?"

I said: "Yes, I've been to this talk and I know."

And he said, "Really?"

So, then we proceeded to have a discussion about the differences between the United Kingdom and Australia (and not just about cricket). We talked about a lot of other things, and yes, there are a few differences, even although we are generally heading the same way. One of the big differences is that the independent retail base, particularly in Western Australia, is very, very strong. Because of legislation, retail groups that employ less than ten people can open from 7:00 in the morning until 10:00 at night seven days a week, whereas if you employ more than ten people, you can only trade from 8:00 in the morning until 6:00 at night, Monday to Saturday. The people who are working hard come home late and do their shopping at night and they shop with the independent retailers. It's no surprise that they have the highest quality produce: they pay the highest price to secure it and they resell it at the highest price. This is still the most valued sector in our customer base.

One store in particular is by far and away the leader. The reason for this is because of the customer service they provide. They are there all the time; they have a very good relationship with the customers and provide good information. We still do a lot of business with the supermarkets, but there are really only two national retail companies in Australia: Woolworths and Coles. We essentially have a preferred supplier status on many lines. However, we're definitely not a category manager: we're nowhere near that. What we do for them is a six-month supply plan. We work together on promotions. We have all the quality assurance and the endless audits that we are delighted to do for them. However, we know what is happening globally and we have a plan that should we need to move, if they ask us to take the responsibility for that step, we can hit the button should that day come. Part of that is working with a network of other companies around Australia to provide a national service to these chain stores. So, we have a foot in each camp at the moment.

Our export and interstate trade is increasing – and this gives you some idea about the psyche of Western Australian producers as we put them both in the same category. This year, the drought has hit harder than ever before and we know growers in the eastern states who are deciding what crops they should leave the water on for and for what crops they should turn the water off. They have to make those heavy decisions. At the

moment, we still have enough water in Western Australia: we are surviving. Export, however, is not a market in which we see a great deal of growth. It is niche lines only and we will maintain our current status.

### **The business**

To give you an idea about the structure of our business, if you were to walk into our business ten years ago, you would have seen sales persons, labourers and administration staff, and that was it. Now, of course, we still have sales people, labourers and administration staff, but we have account managers, quality managers, logistic managers, information technology (IT) managers and in-store demonstration staff. Our business has a very diversified skill base to ensure we service our customers properly. Some of the changes in technology are well known throughout the industry worldwide, but there have been a lot of advances in cool chain technology. The IT system is of particular interest for me because it lets us do some really good analysis on our supply base. It enables us to identify the gaps. We can also do it for our customers and identify where our value really lies.

Quality assessment. Ten years ago if you got a consignment of fruit that was not good, you would ring up the grower and say: "This doesn't taste sweet enough" and the grower said, "Yes, it does" and "No, it doesn't", "Yes, it does", "No, it doesn't" and on it would go. Today we have refractometers and we will test 100 pieces of fruit. Today, the conversation goes something like this: "Sixty-six percent of your fruit was under 9°." "What are you going to do about it?" Of course, we have digital cameras and we can also send a photo. This has greatly helped to increase the level of trust along the supply chain because the information is more accurate. Faster transport has improved market access, but good communication is essential. We spend our lives on the phone and generally have a pretty good coverage between the morning and the afternoon shift as a rule to know what is going on.

One of the things that we have always done is invest in new innovations. In one particularly case, we lost a lot of money. What we do now is to look for partners across Australia to invest in innovations. This is not just new varieties, but also new processing lines. One thing we are looking at now is a new fresh cut processing system which focuses on the hygiene throughout the system. There are some really exciting things happening here, but if we share the investment we share the risk, and when it gets to the development stage, you have a group of companies around Australia that can roll something out nationally straight away.

We get asked all the time, how do we add value as a wholesaler? "You don't do anything; you don't grow anything; you don't sell anything. You just get stuff in and move it out. What do you do?" For our growers, the ones with whom we have a good relationship, we get involved right at the start in terms of helping them get access to different varieties. We help plan the crop. For fruit like apples, we help them with their storage, telling them when to pull it out, when to pack it, and increasingly what to pack it into, because right back at the start of the chain, the type of package will determine what markets you can access and that will have a significant effect on your net price at the end of the day.

We pay quickly which is an important thing for a grower. For some particular growers, we will actually help them with advance payments and investments in the crop. But the most important thing we do is communicate market changes quickly. We are able to respond. For our customers, we have a very serious customer service focus, and that means being able to supply what they want, when they need it. Because we cover such a broad geography, we are generally able to provide that. If there is something they need which we said we would have and we don't have it, then we go and get it. We are continually looking at improving our logistics. We do all the quality management. We get involved in supply and promotion planning and for supermarkets this is a six-month thing. For the retailers on the floor, that is just about daily, "Next week we will have this; next week we will have that; next week we are not going to have this" and that kind of thing. We are working with other companies in terms of the variety management issues that are a day-to-day part of our business, and we invest as things become available.

In summary, we work with all the participants in the fresh produce supply network. I was pretty impressed to hear that word yesterday, the "network" not the chain, because we have to deal with many different scales of suppliers and customers. If there is one thing that we do particularly well, I believe it is that we are consistently gathering information from all sectors of the market and working with our suppliers to respond quickly and take advantage of that. I am happy to take any questions.

DELEGATE: Jenny, in the future with those large investment companies, how are you planning to handle the volume of fruit in your domestic market?

MS MERCER: It's fair to say that we weren't involved in the planning of them to start with, but given that they're here now, they intend to export. We are working with them. We obviously have some opportunities working with the supermarkets because of the large volumes, and these companies are quite prepared to invest in the grading and the technical management of the fruit. I suspect the first couple of years will be quite rough, but more than likely, if they are prepared to keep investing, we will be able to get to a stage where we will be able to grade and deal with that fruit and be able to programme it into the large retail environments.

DELEGATE: I would like to ask how you control the quality of produce from the farms?

MS MERCER: We have an approved supplier programme where we encourage our suppliers to adopt quality management systems on their farms. There are a range of them: SQF (safe quality food), HACCP (hazard analysis critical control points) and in Australia, we have a programme called Freshcare which is specifically designed for on-farm horticultural production. We encourage all of our producers to adopt them. Of course, not all of them do, so then it is our responsibility to segregate the fruit from those who have and those who have not. Typically, the growers who have fresh produce quality assurance are able to access a lot more markets and subsequently get a higher return. Slowly, most growers are starting to understand that if they do invest in on-farm quality management, they actually get a better price, even though that is more often a

result of being able to access more markets rather than a price premium. This is something that takes quite a long time to work.

DELEGATE: Do you have to do internal audits of the farms?

MS MERCER: No. We don't do the audits. We insist that our producers have a third-party auditor system. There are internationally accredited audit companies that go out and do the audits on-farm. Our responsibility is to get a copy of their accreditation and check that it is up-to-date. We do ask for a copy of the minimum residue limits, the chemical test, and for high-risk crops, a copy of their microbial testing. This is how we check that they have done the right thing.

DELEGATE: You did not mention the word contract farming. As a typical wholesaler, you're probably not involved in that, but my question is: is there extensive contract farming in Western Australia and other supply chains that bypass your wholesale chain?

MS MERCER: Contract pricing doesn't happen that much in Australia except in the food service industries. As you know, people who service McDonalds do so under a contract, but typically in Australia, none of the supermarkets offers a long-term contract. They tend to offer long-term supply plans where they say, "we will take X amount of produce off you", but at this stage, they don't accompany that with a price. The way we work with suppliers is not with a contract price, but for the suppliers that we work closely with, we get involved right at the start in terms of what varieties to plant and how to plan their farm. We often get involved in sharing some of the risk and will invest in some of those new varieties with them. This is partly to help them manage their cash flow, but also partly to secure that variety so that we have it available to supply our customers.

DELEGATE: What is the competitive situation? How many firms do you compete with for product? How are the farmers assured of the best price?

MS MERCER: There are 22 wholesalers in the Canning Vale market. There are not too many industries in the world where you can go to a place and have all the competitors in one spot and run around and get the best price. So it is a very competitive environment to start with. When you get good growers, you want to keep them. The way we do that is to make sure we give them the best possible price. Because we work with exporters, the supermarkets, the independent retailers and the food service people, we have a very good understanding of what the price is on most days. We will place their produce where we can get the best price. We operate on a commission, so obviously the higher we sell the produce for, the more money we make as well. If you get a good grower that does the right thing, you really want to keep them. We can't afford to pay them the wrong amount of money or give them the impression that we have done the wrong thing, because once you have lost them, you have lost them for a very long time.

## **The fresh sweet potato market chain in Bataan (the Philippines): the importance of interrelationships between actors for chain management**

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### **Abstract**

*This paper discusses an application of the structure – conduct – performance model to analyse the trade of fresh sweet potato from Bataan province to the wholesale market in Manila, the Philippines. The sweet potato chain is relatively short, but rather complex due to various informal social relationships. The behaviour of the actors involved is largely determined by their position in the market system. Due to the lack of transparency in market prices, producers act suspiciously towards the prices offered by traders. It was observed that this suspicion is often unfounded and that traders are, for the most part, offering a realistic and fair farm-gate price. Organization of the marketing system is achieved through a combination of elements from three different coordination models namely markets, hierarchies and networks. The environment in which the actors operate is one of mutual benefits. The most important form of communication is trust and cooperation, which is the key that activates the interaction at all levels in the chain. The analysis also revealed the importance of wholesalers in the system. Through providing working capital to traders, wholesalers indirectly provide the capital and inputs to producers. Trust and respect, which form the basis of a network, were the cradle for an environment in which such a vital informal credit scheme could emerge. The existence of producer and wholesaler networks, which are linked through traders, enhanced the effectiveness and efficiency of the system. However, a different picture emerged when examining the inequity of the system. It can be concluded that there are some inequalities and that there is room for improvement.*

### **Background**

This paper is the result of a study that has been carried out as part of an M.Sc. thesis at Wageningen University and Research Centre, the Netherlands. The research was conducted in Bataan, Central Luzon, in the Philippines, with the aim of exploring the sweet potato marketing chain. The study was undertaken within the CIP-UPWARD research programme, which supports root crop development in Asia. CIP-UPWARD is a collaborative network between the International Potato Centre (CIP) and the Wageningen University and Research Centre (WUR).

The research objectives were to:

1. Describe and analyse the interrelationship between sweet potato producers and traders and identify coordinating mechanisms between the two.

2. Describe and analyse the interrelationship between sweet potato traders and wholesalers and identify coordinating mechanisms between the two.
3. Determine what type of market information exists, and in which way this information flows from the wholesaler to the producer.

### **Methodology and framework**

This research was carried out using rapid reconnaissance techniques. A rapid reconnaissance assessment is used to obtain a broad and preliminary overview of the operation and performance of food systems or components thereof and designed to identify constraints and opportunities. The following features of the reconnaissance survey have been used:

- Interviews were unstructured and semi-directed;
- The researcher conducted the interviews with the assistance of interpreters;
- It had a largely informal character and purposive sampling was used rather than random sampling;
- Observations played an important role. Sweet potato roots were tracked down from the farm to the wholesale market. During this process, the interaction and communication between the various actors in the chain was observed.

To verify the data collected, two multi-stakeholder workshops were organised to discuss the research findings.

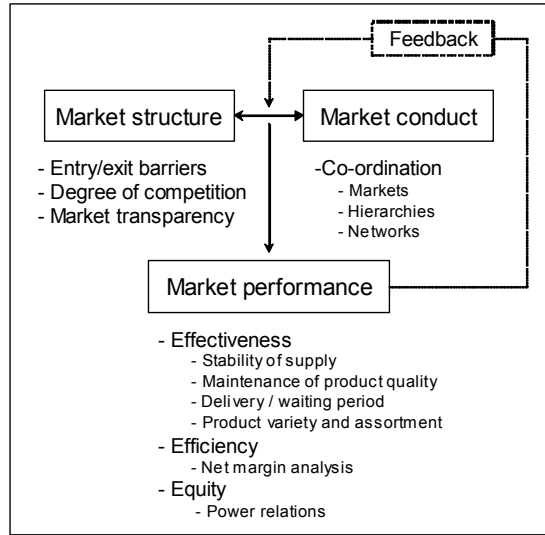
This qualitative field research was placed within the theoretical framework of the Structure - Conduct - Performance model (S-C-P). S-C-P analysis or market structure analysis is an approach that has often been used to evaluate food commodity marketing systems (Dijkstra *et al.*, 2001; Lutz and van Tilburg, 1997; Douma and Schreuder, 1998). The applied model consists of three theories: industrial organization theory, marketing theory and institutional economics theory. The approach was found to be particularly suitable because it links the total performance of the system to the interdependency between the actors in the chain within the dynamic context of marketing environment and power relations. It is a systems approach in the sense that all marketing links from producer to wholesaler are considered part of one system. In Figure 1 an overview of the applied model is presented.

### **Discussion of research findings**

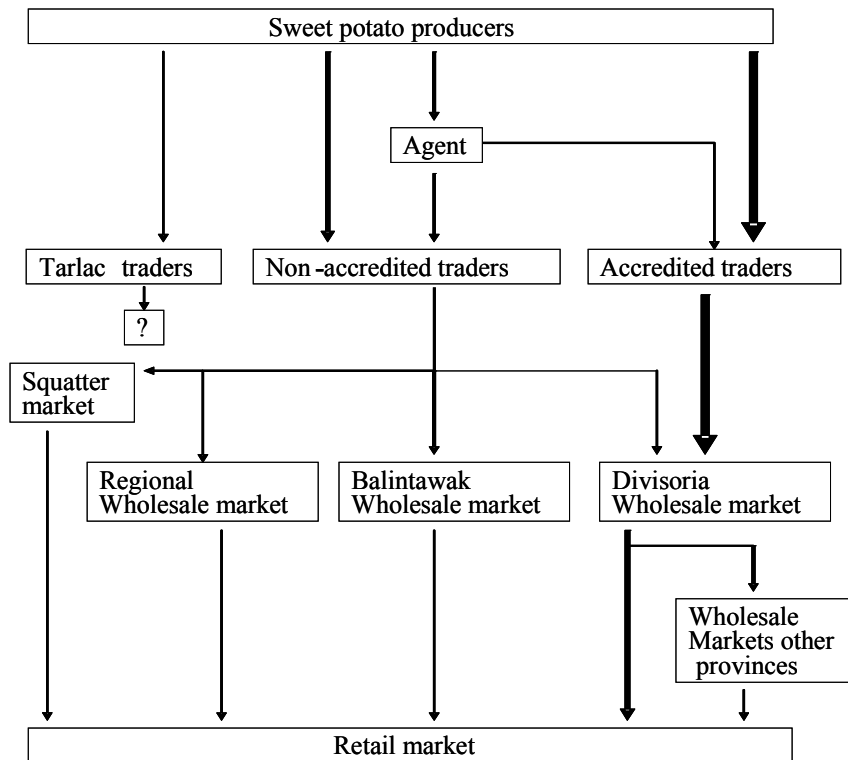
#### **Quantifying the sweet potato trade**

Some 4 300 tonnes of sweet potato roots, produced by 500 producers from Bataan, entered the market in 2002 (Keizer, 2003). The average yield was between 4.3 and 8.6 tonnes per hectare marketable roots. After harvest, the majority flowed immediately from the producers to traders (Figure 2).

**Figure 1: Structure – Conduct – Performance model**



**Figure 2: The distribution chain of fresh sweet potato in Bataan province 2001–2002**



The role of the agents is limited, for they trade around 11 percent of the total volume of fresh roots. The five accredited traders handle roughly 65 percent of all the sweet potatoes produced in Bataan. The non-accredited traders are responsible for around 20 percent, with small traders from Tarlac handling whatever remains.

The Bataan traders have five main outlets for their product. The biggest part is sold at the Divisoria wholesale market in Metro Manila, which is served primarily by the accredited traders. From this market, the produce finds its way to smaller wholesale markets in other provinces and the retail market in Metro Manila. Non-accredited traders supply, besides the Divisoria market, numerous other markets. An important outlet is the Balintawak wholesale market in Metro Manila. This market is smaller than the Divisoria, but is more conveniently located. Three non-accredited traders have contacts with wholesalers in regional wholesale markets in neighbouring provinces. The final outlet a trader can supply is the squatter market. Retailers with no permanent stalls occupy this market.

### **Structure of the chain**

Table 1 presents an overview of the elements, which were applied to analyse the market structure. It can be concluded that at the level of the trader and the wholesaler, the market can be regarded as an oligopsony. Both are characterized by few buyers and sellers and entry barriers protect the incumbent traders and wholesalers. Powell (1998: pp. 273) states: “By establishing enduring patterns of repeat trading, networks restrict access. Opportunities are thus foreclosed to newcomers, either intentionally or more subtly through such barriers as unwritten rules or informal codes of conduct”. Future developments in the sweet potato trade will tell if the current oligopsony position of the wholesalers will change into contestable competition through increasing pressure from the squatter market.

Producers find themselves in a market environment, which can be characterized as contestable competition. Entry barriers exist but these can be overcome. In general, the market is open to new entrants. The sweet potato system is fairly transparent.

### **Conduct in the chain: social relationships as the basis for coordination**

The relationship between the wholesaler and trader forms a vital link in the sweet potato marketing system. Both actors realize that a good and strong relationship between them creates the foundation of the system. Wholesalers hold a dominant position in this interrelationship; they provide the traders with the necessary working capital to be redistributed to producers. They also control supply by placing more or fewer orders. In the event that the market becomes oversupplied, the wholesalers may completely stop ordering any sweet potato.

The socioeconomic relationship of patronage is referred to as *suki* in Tagalog. When one person has a *suki* relationship with another, it creates a bond. *Suki* is gained after many years of trading with the same person. During this period, trust and respect develop. It means that this person will always do a large part of their business with the same individuals. Even when prices are lower somewhere else, the person is obliged to do business with their *suki* trader, wholesaler or retailer.



**Table 1: Overview of the sweet potato market system structure**

<b>Structure elements</b>	<b>Producer</b>	<b>Agent</b>	<b>Trader</b>	<b>Wholesaler</b>	
<b>Degree of concentration</b>	Buyers	Few	Few	Few	Many
<b>Entry barriers</b>	Sellers	Many	Few	Few	Few
	Capital	Important <sup>1</sup>	Not required	Important	Important
	Access to producer network	Less important	Essential	Essential	Not necessary
	Access to wholesale network	Not necessary	Not necessary	Essential	-
	Land	Essential	Not necessary	Not necessary	Not necessary
	Space in warehouse	-	-	-	Essential Limited space available
<b>Exit barriers</b>	Sunk costs	Negligible	Negligible	Limited	Limited
	Collect outstanding debts	-	-	After growing season (3–4 months)	After growing season in all production areas (one year)
<b>Market transparency</b>	Price information	Limited access with time lag	Less transparent	Transparent	Transparent
	Product information		Transparent for all actors		

<sup>1</sup> Social networks play an important role in this. When producers have to resort to traders to obtain capital, the importance of social networks becomes important. Through these networks, traders and agents verify if the borrower is creditworthy.

There is a strong interdependency between traders and producers in the chain. The producer depends on the trader for the marketing of his produce while the trader depends on the producer for a regular supply to secure his income. Besides this, traders play another vital role in the sweet potato production system; they are the ones who source the capital and inputs to provide to producers so that they are able to grow sweet potato. It was observed that the biggest trader in Bataan often visited neighbouring provinces for a couple of days to source credit from his contacts there. However, there are, of course, implications when credit is received. Usually the condition for acquiring a loan is that the producer is obliged to sell his or her product to the trader. Interestingly enough, traders and producers both deny that an interest rate is being charged. However, it was noticed that those producers who are tied to a specific trader through credit or input loans have little or no power when it comes to price negotiation. It can be concluded that credit-receiving producers pay a somewhat hidden interest charge, due to the lower prices they receive for their product. Non-credit producers mentioned that they often received a price premium of Ps 20 – 30 per bag for their product. They were able to receive this higher price due to their ability to “shop around” and look for a trader who suited them better. Sometimes higher prices were offered by the traders to producers as an incentive to deliver their produce to them. This was often done where the producer had a large area ready for harvest. Traders reportedly gave preference to larger producers over smaller producers, most likely because it would reduce their transaction costs, thus giving them higher margins. Creating economies of scale can therefore be an important marketing strategy for producers to obtain higher farmgate prices.

All these requirements and involvements make it seem that producers are not benefiting from this credit tie-up. Nevertheless, through this informal credit system, producers are able to acquire the necessary capital to grow sweet potato. Without the traders, they would have to resort to borrowing from the so called *Bombay* shop, a money lender, who, on average, charges at an interest rate of 10 percent per month with less flexible pay-back arrangements. Borrowing from relatives was not really favoured, since this might disturb social relations.

Figure 3 presents an overview of all interrelationships between the various actors in the chain. As can be observed from the figure, the sweet potato system not only consists of the four key players: producers, agents, traders and wholesalers; but is in reality much more complicated and includes actors such as packers, checkers and farm workers, and is often organized around a network of friendship and kinship relations. These social networks consisting of largely informal relationships with friends, neighbours, colleagues and relatives, are vital for the functioning of the total chain.

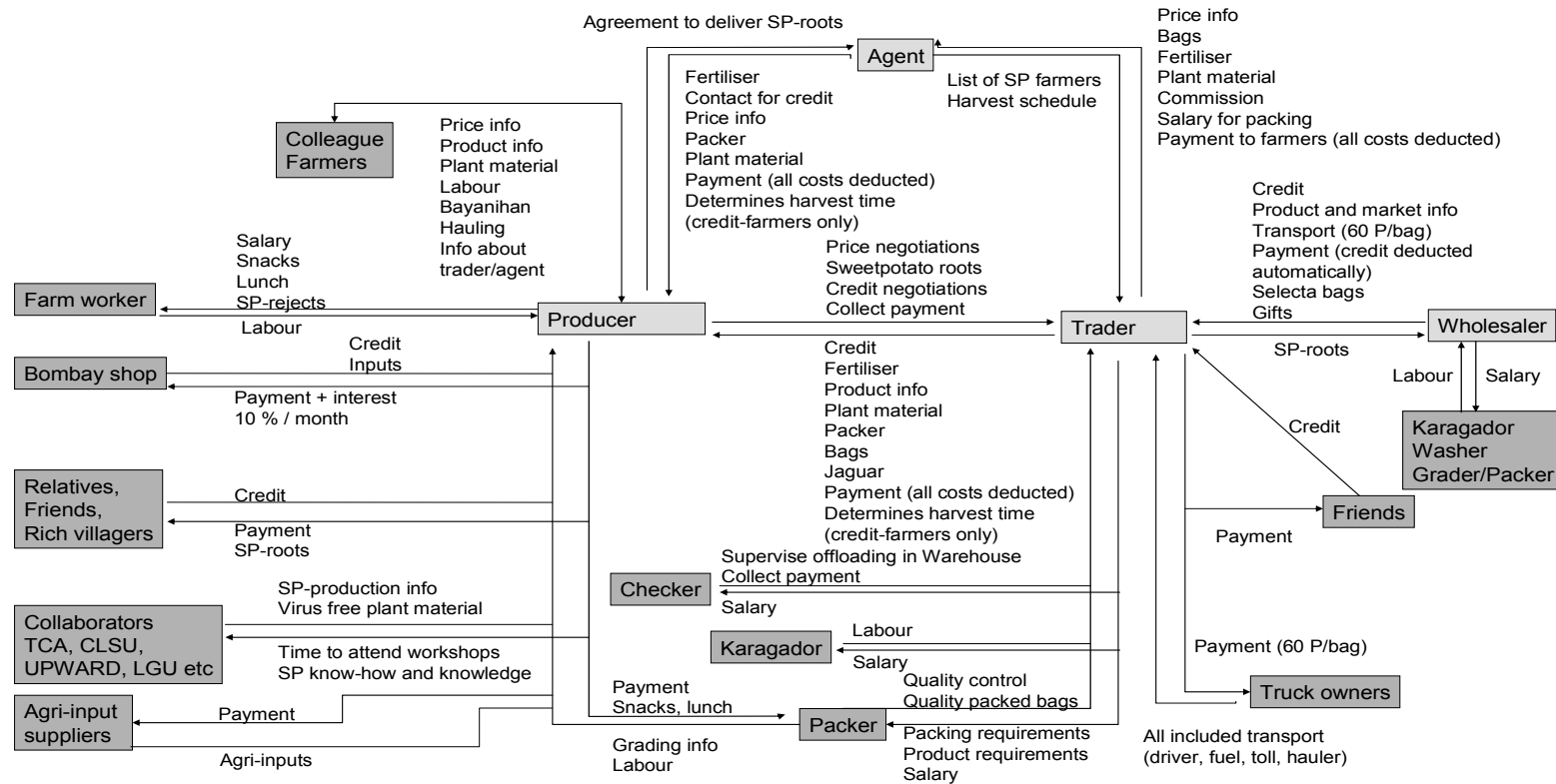
### **Performance of the market system**

Four elements<sup>8</sup> were applied to analyse the effectiveness of the marketing system. In general, both traders and wholesalers are satisfied with the supply of sweet potato from producers during the harvesting season. During discussions held with wholesalers it was indicated that Bataan could occasionally not supply the market due to bad

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<sup>8</sup> Stability of supply, maintenance of product quality, duration of delivery process, and product variety and assortment.

Figure 3: The sweet potato marketing chain unravelled



Source: Keizer (2003)

Note: A “Jaguar” is a sort of pick up truck that is completely run down. The term also refers to some sort of vehicle to bring produce from the farm over very steep and muddy roads to the market road where the produce is offloaded from the “Jaguar” and loaded onto normal trucks.

weather conditions, which make harvesting, packing and transport from the fields virtually impossible. However, this does not occur more than one or two days per season and wholesalers have sufficient stock to overcome this temporary lack in supply. To monitor the quality of the roots traders send packers to producers' fields. In this way, traders are assured that the required quality is provided. After packing and transporting the roots from the field to the trader, product quality is virtually guaranteed. Since Bataan is situated close to Metro Manila and an adequate road system is in place, roots are delivered to the wholesale market within hours after harvesting and product losses are negligible. Due to this effective system, transport has no effect on the quality of the harvested produce. To protect the quality during transport, roots are covered with plant material.

Bataan is near the wholesale market, trucks reach the warehouse within two to three hours. Ordering new supply for the next days is usually done during the night when traders deliver their products to the Divisoria wholesale market. The following day producers are instructed to harvest the required volume. The Divisoria is supplied within 16 hours after ordering.

Bataan producers supply the Divisoria with two varieties, mainly Super Bureau and to a lesser extend Taiwan. Other provinces supply different varieties, for example Ube and Bentong. The varieties are characterized by different taste, colour, texture and cooking qualities. During discussions held with wholesalers, it became clear that there is scope for new varieties to enter the market, although they indicated that the volume demanded for new varieties is still low. Currently, Super Bureau is the dominating variety in the market.

Taking the efficiency of the system into account, it can be concluded that producers make good margins if they are able to produce in the lean months (see Table 2). However, when comparing the producers' income to that of traders and wholesalers, it is substantially lower. In addition, producers put more effort into obtaining this income compared to traders and wholesalers. Nevertheless, the distribution of the marketing margin across the actors can be considered fair.

Examining the equity of the system showed there are some inequalities noticeable and that there is room for improvement. To improve equity in the chain it is often recommended that producers should organize themselves in marketing cooperatives. This would give producers more power. Evidence has been presented which shows that the relationship between traders and wholesalers is strong. To simply bypass this relationship is not possible. It may, however, be possible to organize producers to strengthen their bargaining power. Producers are currently not organized into producer groups. It was mentioned by traders that producers with large volumes (more than 500 bags) received a higher farmgate price. This may provide an incentive to producers to bulk their produce together and negotiate higher prices.

**Table 2: Net margins lean season (September)**

<b>Expenditure</b>	<b>Costs / Price (Ps/kg fresh root)</b>	<b>Margin (Ps/kg)</b>	<b>Income (Ps/ day)</b>
Production costs	2.51		
<u>Marketing costs producer</u>			
Packer	0.09		
Transport	0.35		
5 percent Contingency	0.02		
Farm gate price	8.82		
<b>Margin producer</b>		<b>5.85</b>	<b>1 490 = 37 300 in 25 working days</b>
<u>Marketing costs trader</u>			
Purchasing price	8.82		
Tax <i>barangay</i>	0.01		
Transport	0.35		
Packer	0.18		
5 percent Contingency	0.03		
Wholesale price	10.59		
<b>Margin trader</b>		<b>1.20</b>	<b>5 000</b>
<u>Marketing costs wholesaler</u>			
Purchasing price	10.59		
Hauling	0.07		
Washing	0.11		
Water	0.02		
Packing	0.10		
Plastic bags	0.09		
Rent	0.13		
Tax	0.01		
5 percent Contingency	0.03		
Retail price	13.35		
<b>Margin wholesaler</b>		<b>2.20</b>	<b>8 800</b>

Source: Keizer 2003

### Conclusions

The structure of the market at the trader and wholesale level can be viewed as an oligopsony and entry barriers protect incumbent traders and wholesalers. The demand side of the market is influenced by the limited number of traders, allowing less room for price negotiations between producers and traders.

Due to the lack of transparency in market prices, producers are acting suspiciously towards the prices offered by traders. It was found that this suspicion often is unfounded and that traders are most of the time offering realistic and fair farmgate prices. However, evidence was presented that occasionally traders and agents showed oligopsonistic behaviour.

The analysis also revealed the important role wholesalers play in the system. They are the main financiers of the system. Through providing working capital to traders, they indirectly provide capital and inputs to producers. Without this capital the sweet potato industry would not stand where it stands today. Through this system of credit provision, the importance of networks became evident. Trust and respect, which forms the basis of a network, was the cradle for an environment in which such a vital informal credit scheme could emerge. Through exploring this credit provision system in more detail, it became clear that wholesalers are the actors who have the largest control over the sweet potato system. By influencing the supply to the Divisoria, they also control the

<sup>9</sup> It is estimated that a producer works 25 days in order to grow one hectare of sweet potato.

behaviour of traders and producers. Fortunately, the power of wholesalers is not unlimited. The existence of the nearby informal squatter market puts pressure on them.

When examining the performance of the sweet potato system, it became clear that the effectiveness and efficiency of the marketing system was good. The existence of producer and wholesaler networks, which are linked through traders, enhances the effectiveness and efficiency of the system. However, a different picture emerged after examining the equity of the system. Dependency exists between producers and traders and between traders and wholesalers. This interdependency leads to a behaviour in which traders have more power than producers and wholesalers have more power than traders. The fact that entry barriers are high at the trader and wholesaler level, together with their oligopsonistic behaviour, contributes to unfavourable conditions for producers. This also stifles emerging traders and wholesalers.

The applied approach has allowed the author to describe the sweet potato marketing system in depth and analyse the system from a holistic point of view. While the Bataan sweet potato system consists of a relatively short chain, it is rather complex through various informal social relationships.

### Acknowledgements

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## The “Bali Fresh” Women Farmers’ Partnership<sup>10</sup>

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### Abstract

*A network of women farmers’ partnerships began several years ago with the formation of the “Bali Fresh” women farmers’ partnership. A partnership between groups of poor women farmers, a supply company and a marketing company has managed to produce, process, pack and distribute and even export high-quality fresh vegetables for the Asian market. Each of the partners needs something: (1) the women farmers need money to invest, technical knowledge and a reliable market for their fresh produce; (2) the supply company needs a market for its high quality seeds, fertilizers, irrigation equipment, greenhouses; (3) the marketing company needs a reliable supply of quality fresh produce all year round and customers who are willing to pay for the products produced. This paper will discuss how this partnership got started, why it is still running and how much money the partners make. The key success factors include; (1) sustainability; (2) honesty and integrity; (3) community development; (4) fund raising; and (5) a revolving fund. The “Bali Fresh” women farmers’ partnership has already been copied in other parts of Asia by the Ciawi Ornamental Women Farmers’ Partnership in Java, the Mountain Fresh Women Farmers’ Partnership in Chiang Mai, Thailand, and discussions are on-going with parties in Viet Nam.*

### Introduction

This is a partnership between a supply company PT Dura in Indonesia, a marketing company PT Dif Nusantara, and several women farmer groups. The women farmers’ group in Bali started in 2004. We started with two female farmers, one in Karangasem and one in Kintamani, and now, after a couple of years, we have about 60 female farmers. The target is to reach 120 within a year from now. The women in Bali needed a stable income, the marketing company needed good quality produce in sufficient quantities, continuity of supply and if possible, a fair price. The supply company needed to sell fertilisers, seeds, irrigation equipment, greenhouses, etc.

The initial capital was invested by the partners. We made the initial investment, but once we had proved the concept, donor money from AusAID and HSP, a Dutch Government support programme, helped us to scale up. It was not that we started because we got money: we started because we thought we could make money and afterwards we were able to get some money from donors. Most often it is the other way round. People have a beautiful idea and then try to get money for it. If they get the money they start: if they don’t get the money, they don’t. This is why a lot of potentially good projects fail.

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<sup>10</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management



Community development and the establishment of a revolving fund was an important part of our success. This was organized by the supply company with some help from consultants.

While we invested the money to help the poor farmers, they have to pay the money back. As soon as they start producing, part of the money has to go back. As this money comes in, it's paid back into a revolving fund. We don't charge any interest. Part of the money that comes in has to go to meet the daily living expenses of the farmers, part of the money has to go to health insurance for the farmers, and part of the money has to go into a savings account. In Bali, we have a lot of ceremonies and every year you have to pay school fees for your children. We force the farmers to save so they will always have some money.

If you want to sell fresh produce, you have to have good quality and high production. We have introduced some new technologies including greenhouse production and hydroponics. To the maximum extent possible, we use local materials. There is little point importing everything you need from the Netherlands, the United States of America or wherever. For our greenhouses, everything including the plastic sheets, bamboo and concrete posts are made in Indonesia. Our drip irrigation systems were also installed using local technologies and installed by our staff.

We wanted to grow hydroponically but first we needed an artificial growing media. While we could buy that from the Netherlands, we chose to use burnt rice husk. Burnt rice husk is a waste product: burn it a little so that all the diseases are eliminated and you have a sterile growing medium, locally made at minimum cost.

When you start growing, you have to use the right seeds. You can use cheap local seeds. You can use anything, but make sure that what you grow is what the consumer wants.

We started with a desire to help the older ladies, but as the partnership grew, we began to work with the young ladies in the village who have little opportunity to make money anywhere else. Training was done inside the greenhouses. Most of the female farmers cannot read and write, so to train them you have to repeat, repeat and repeat again, using drawings wherever possible. We use Dutch or Indonesian trainers and Dutch or Thai technical advisors.

We started growing cucumbers in the first greenhouse in January. The first crop of cucumbers was a success. We have also started growing cherry tomatoes. There is a good demand for cherry tomatoes and the product realises a high price. Production is going well. In small greenhouses (200 m<sup>2</sup>) we have 500 plants, and on average, each plant produces 4 kg.

We also do some outdoor growing. With assistance from AusAID, we are endeavouring to improve lettuce production through the introduction of pressed blocks. They gave us some money which made it possible for us to produce better seedlings. More recently, through the introduction of drip irrigation and netting, we have been able to move towards integrated pest management.

We are currently undertaking some research to identify which system of irrigation is better under plastic, outdoor, or in the net houses. Students are a huge opportunity to get cheap research done for you. More recently, we have constructed a modern greenhouse to be used as a practical training centre.

In Bali, international tourists don't want to eat vegetables with a lot of chemicals. Reduce the number of chemicals, improve the quality and you will improve your market share. To facilitate sales, we brought the hotel chefs to the farm to show them what we were doing.

As the product is harvested, it is brought to the marketing company. This is an integral part of the partnership. However, communication between the farms and the sales department is often problematic. People still manage to make mistakes.

We work with the packing material producers. We continue to invest to make sure that we can deliver what the consumer wants. Look around in supermarkets. Look at what other people do. See what is happening in the Netherlands or Thailand and then apply it in your own location.

Community development is important. Every now and then we make sure we gather with the whole group. We go swimming, we go picnicking and we invite the husbands – sometimes jealous husbands and sometimes the not-so-agreeable husbands – but we bring them in a group and we do things together to make sure that the farmer, who is a mother or a wife or a daughter or a grandmother, gets support from the whole group. Community development is an important part of our success. Do not underestimate the power of jealousy and all the strange things that can come from that.

Is it easy to copy the “Bali Fresh” Women Partnership? I think so. The Ciawi Ornamental Women Farmers' Partnership has started. This is a group of women farmers in West Java who collect, pot and grow a range of ornamental plants for a Dutch and Russian buyer. We grow them, we pack them and put them in a container and send them to Europe. Again, the women farmers needed a stable income. The buyer needed quantity, quality, continuity and a fair price. The supplier needed to sell fertilizer, pots, irrigation, etc.

Money has been invested by the partners: the farmers and the market company. The farmers, of course, cannot invest that much. Community development has been organized again by the supplier and the first container has been sent and received in good order. A new deal has been sealed for the next 12 months: two containers a month. Now that is a lot of money.

### **The “Bali Fresh” label**

We first started with the name, PT Dif Nusantara. That was the name of the company at the time. Then we found out that there was another company called R Dif and people were mixing us up. A stupid mistake from the beginning, but that is what you do when you are a very small company and just starting. To change our company name was a bit difficult and rather expensive, so we thought that we would add on a brand name.

How did we come to “Bali Fresh”? No expensive consultants or research was involved; simply a group of friends checking out names in magazines. As we wanted to start a business in Bali, “Bali Fresh” emerged. It was as simple as that. We just copied something.

We adopted a very similar approach when we started with “Tasty Thai” in Thailand. “Tasty Thai” actually comes from “Tasty Tom” in the Netherlands. There is a company selling their tomatoes as “Tasty Tom”. “Tasty Thai” sounds nice. We have since sold “Tasty Thai”. “Take Me Home” is the new brand name we use in Thailand. Again, no market research was involved here either, but a fair amount of beer was consumed to inspire creativity.

“Bali Fresh” is a brand name. To build the brand, we put some words around it. We have heard these words during this seminar: quality, fresh, safe, reliable, innovative, sustainable, Fairtrade. The difficulty we have is making it clear to our potential buyer that we are sustainable and safe, that we are working with Fairtrade, we’re innovative, we have quality and that we are reliable and fresh.

You can put information in your label, but there is so much information to put in your label that it actually becomes rather confusing. We decided to put only “Bali Fresh” on the label. But then, how do you communicate good agricultural practice, HACCP, GLOBALGAP, organic, pesticide free, and all those things? If we look a little bit at what we see in the market, especially in Bali, there is so much information on the packaging from “Pesticide free, hygienic, healthy, organic, non-pesticide, non-chemical, no fertilizers, GMO-free, pesticide safe” or “Vine ripened, naturally pollinated, no preservatives”.

What does the consumer think about all this? Organic: some people know, some people don’t, but actually, I don’t like this organic thing. In a country of 275 million people like Indonesia, according to FAO reports, we eat only 45 percent of the required fresh vegetables for good health. That means that there are not enough vegetables to feed all the people in Indonesia. Besides that, golf courses, industrial parks and housing estates are taking away all the good quality land and every year we have about three to four million extra people in Indonesia. We have a small problem, like improving production, doubling production or maybe even tripling production. Yes. Organics is a nice idea, because there is an export market. I don’t want to blame people who make money exporting organic vegetables, but we have a major problem in Indonesia to feed 275 million people every day. If we start growing organic, that means that production will drop. Production has to rise.

Many promises are made: “organic, no pesticides, naturally pollinated, no GMO”, but how can we verify or prove these claims? We sell chemicals to organic factories and to organic farms, but they still put “organic” on their label. Our group, the “Bali Fresh” Female Farmers, are not organic, but we are trying to improve the situation by using the minimum amount of chemicals. We do not promise that we are organic, because we cannot produce enough. We don’t want to claim that on our label, because we would then have to implement a system of control to check that what we put on the label is really true. At the moment, that is not cost-effective in Indonesia.

For the “Bali Fresh” group, we are sustainable. We use a lot of waste to grow our vegetables. It is not organic, but it is hydroponic. We use rice husks, we use bamboo greenhouses, we teach and train our farmers. We try to make them independent, and if they so choose, they are free to leave the group.

Food safe. Yes, I think we are food-safe. We use local predators and imported predators to control aphids. We cannot talk about child labour, but after school, we pay the children Rp 50 to collect small beetles. We then let them loose in the small greenhouses to take care of the aphids. When and if the problem becomes bigger, then we spray. But first, we use glue traps to make sure that we have a problem. We know when we will start to harvest and therefore what chemicals we can use.

Innovative. Yes, I think we are innovative. We work together with the seed companies to choose varieties that are more resistant to diseases. If you use less chemicals, that can help catch the market. Having yellow, sweeter tomatoes and things like that also help us to capture a larger share of the market.

DELEGATE: Thank you very much. Could you give any figure about the cost or the net income that you get from outdoor and indoor cultivation?

MR SERHALAWAN: Investments were about US\$2 000–3 000 per farmer on average. At the moment, the average income of a woman farmer in Bali is about Rp 900 000 to 1 million per month which is double the minimum wage, so their livelihood increased a lot.

The US\$2 000–3 000 loan to the revolving fund is paid back in an average of two to two-and-one-half years. Because we have several farmers, when ten farmers or twenty farmers pay back a certain amount every month, it means that after two months, we can start with new farmers. That is why we suggest that we will have 120 members within a year, because the money is coming back.

DELEGATE: You mentioned about the acquisition of land. How did you do this, because in many cases the small farmers don't have land? My second point is that you use greenhouses. When you enter into larger-scale production, have you thought about the environmental aspects?

MR SERHALAWAN: In Bali, especially for women, it is difficult to own land. In their system, the men own the land, so if you are a single woman or a lonely grandma, it is difficult to own land. So, what do we do? We rent the land as a partnership. We set a sort of a standard that we will only pay Rp 880 per m<sup>2</sup> per year and we will pay that to everybody. There are no special deals. There is no turning back and there is no changing the price, and there is no kicking us out after time because we have become big. We work together with government, the local religious leaders and local youth groups.

Environment. Yes, we think that this is important. We use greenhouses and we use netting houses. We use fewer chemicals to control pests and diseases. We have done four years of research into growing vegetables with predators using integrated pest management. We have not been completely successful, but we have made some serious

steps, which is important. The environment is important because it provides us with a point of differentiation. The consumers want environmentally friendly products. Besides, it is in your own long-term best interest to show responsibility towards the environment, the consumers and the farmers. If you do not do that, you will lose the market in the end.

## **Alternative vegetable supply chains in the Philippines**

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### **Abstract**

*The Filipino vegetable industry is dualistic in nature. Traditional chains exist together with the more modern chains. Different institutional markets are involved in various marketing arrangements, each developing as a response to various external and internal factors. This paper will discuss the alternative vegetable chains which have been observed in the Philippines. The Philippine vegetable industry is restructuring, largely driven by demand factors such as increasing population and income and the changing lifestyles of urban consumers. This creates opportunities for modern chains to respond, particularly for supermarkets and fast food chains. Procurement systems also change to respond to these opportunities. The increasing demand for salads has prompted fast food chains to source processed instead of unprocessed vegetables. This has required changes in production protocols for farmers who supply to vegetable processors. Large supermarkets deal with preferred suppliers who also brand their vegetables. As large supermarkets continue to raise their standards, the volume of vegetables sold that are branded is expected to increase. This will result in larger consolidators who may also venture into vegetable processing, particularly cut vegetables and packed salad vegetables. Small farmers will have difficulty responding to these opportunities in the modern chains as these will require significant investment to produce quality vegetables.*

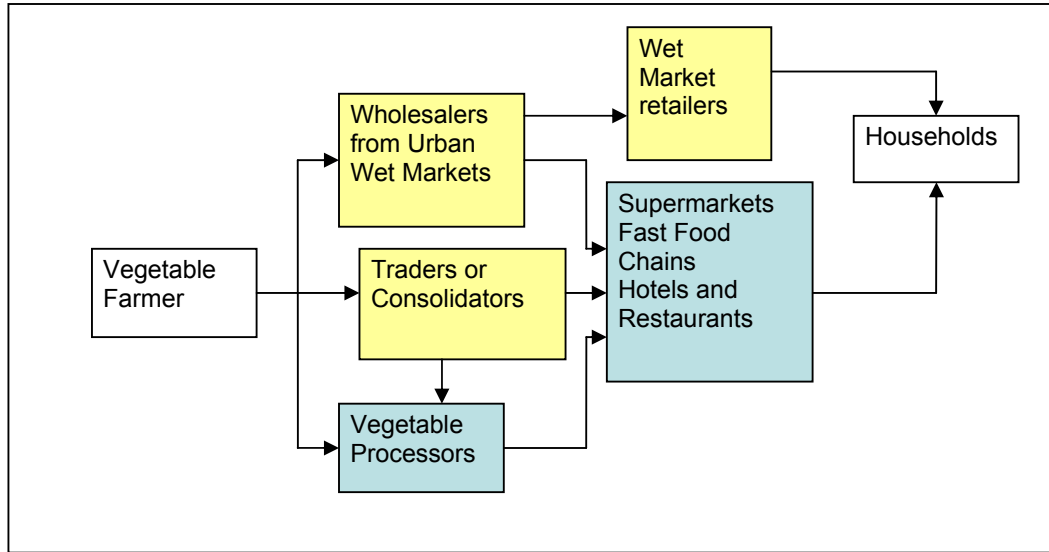
### **Introduction**

Dynamic changes are occurring in the competitive structure of the Filipino vegetable industry, leading to changes in supply chains. Consumers and customers are increasingly concerned with food safety and traceability, health, convenience and sustainability of production systems (Collins, 2006). In this paper, the traditional supply chain is described followed by a discussion of the emerging alternative supply chains observed in the Filipino vegetable industry during the past three to five years.

#### **Dualistic vegetable supply chain**

Vegetables in the Philippines are grown primarily by small farmers, planting an average of 2 500 square meters per cropping season (Rasco *et al.*, 2004). In recent years however, large agribusiness firms, the main business of which is banana and pineapple exports have ventured into vegetable production.

The vegetable supply chain in the Philippines follows a traditional chain (Figure 1) where farmers sell their produce in the spot market to traders, consolidators, vegetable processors and wholesalers in the wet markets. Wholesalers usually sell their vegetables in the wet market while some traders sell to institutional markets such as supermarkets, fast food chains, hotels and restaurants.

**Figure 1: The Filipino vegetable supply chain**

Very few farmers supply directly to vegetable processors or institutional markets.

In a study conducted in Benguet, spot exchange is the most common marketing arrangement used by 58 percent of producers and traders in the La Trinidad Trading Post and Baguio City market (Milagrosa and Viane, 2002). The same practices prevail in the rest of the country. While spot market trading is highly risky for the farmers and even for the traders, it can also be highly profitable. Frequent transactions occurring in highly uncertain environments heighten the probability of conflict. While vertical integration may be an option, this is not always possible for small farmers because of immense financial and organizational requirements.

The retail market for vegetables is still dominated by the wet markets, for a number of reasons. Consumers generally buy fresh produce in wet markets for they offer a greater variety and assortment of vegetables at lower prices than supermarkets. In Mindanao, 90 percent of households prefer to buy from wet markets and *talipapas*<sup>11</sup>, in smaller quantities, three times a week (Concepcion, 2005). Farmers, on the other hand, rely on traders in wet markets and consolidators for institutional buyers such as supermarkets, hotels and restaurants.

However, increasing income and the changing lifestyles of urban Filipinos have not only contributed to increased consumption of high value vegetables, but have also played a role in the proliferation of fast food outlets and one-stop shopping malls and supermarkets, as high income consumers demand convenience. These have triggered changes in the supply chain for vegetables in the Philippines.

Firstly, the number of consumers buying vegetables from supermarkets has increased, particularly those in the urban areas, consistent with the higher growth of vegetable

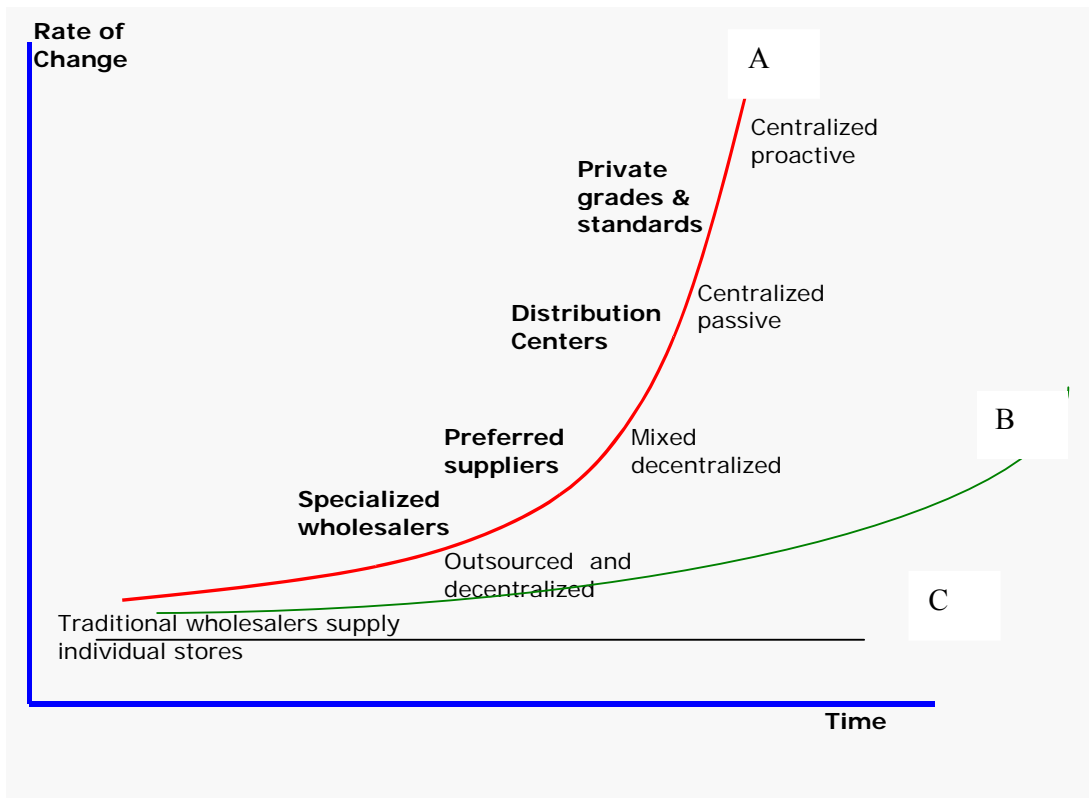
<sup>11</sup> A *Talipapa* is a small neighbourhood wet market which sources its produce from the central wet market and backyard gardens.

consumption in urban areas (Digal and Concepcion, 2004). This is an opportunity now being tapped by supermarkets and fast food outlets. An example of this is a large supermarket in Metro Manila which has expanded the number of shelves from two in 2001 to three counters in 2004. By 2006, many supermarkets had increased the floor space devoted to vegetables by at least 30 percent.

Secondly, with an increasing display area and assortment, supermarkets have decreased the number of suppliers and prefer to deal with consolidators and concessionaires. Thirdly, as they deal with higher-income consumers who are more quality-conscious, they have imposed higher quality standards.

In the Philippines, the differences between low- and high-income consumers create a wedge in the supply chain resulting in a dualistic vegetable supply chain: the traditional chain (wet market) and the modern chain (Figure 2).

**Figure 2: Pillars of dynamic supply chains in the Filipino vegetable chain**



Curve A represents the high-income segment served by modern downstream firms such as supermarkets and fast food outlets. Procurement systems in this segment are fast-changing, responding to consumer demand and competition (Berdegué *et al.*, 2005). Curve A would be typical of most transitional economies.



Curve B is the traditional wet market typical in the Philippines, which basically serves the low-income consumers. Wholesalers in the wet markets supply the small retailers and some modern retailers. Many supermarkets in the Philippines continue to source produce from this traditional chain. Because of this dualistic nature, the rate of change in procurement systems may not be as fast as in many other countries, resulting in a flatter curve C (Digal *et al.*, 2006), instead of curve A.

To some extent, these chains B and C are substitutes and therefore they compete and affect one another. One large supermarket in the Philippines lowers price of vegetables to compete with the wet markets. These changes in procurement systems are reflected in the types of vegetable supply chains discussed below.

Around 75 to 85 percent of the vegetables sold in the Philippines pass through the traditional supply chain where the wet markets and vegetable traders play major roles. Farmers are generally price takers, accepting what the traders give them in the spot market.

Several alternative chain designs have emerged in the last three years. Key informant interviews with different players in vegetable supply chains from Benguet and Mountain Province on the island of Luzon and Southern Mindanao have yielded data which can be typified as alternative chains.

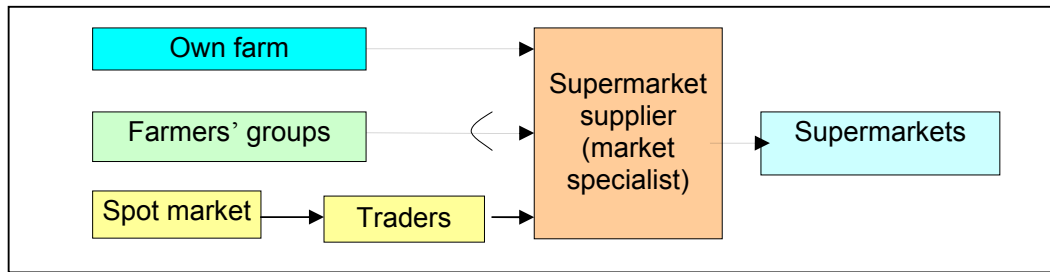
#### **Market specialist chain**

One arrangement recently observed in the Philippines is the market specialist chain where suppliers focus their strategies on providing the supermarkets with anything that they need. In the words of one of the respondents, “we will give them whatever they want”. This means that the market specialist provides a wide array of vegetables including minimally processed, precut and mixed, packed, coded and tagged produce and any other combination thereof. They brand their products, particularly their prepacked salads. The company name is visible on each pack of vegetables. The market specialist is given an assurance by the supermarket chain that they are the preferred supplier and that all fruit and vegetables will be sourced through them.

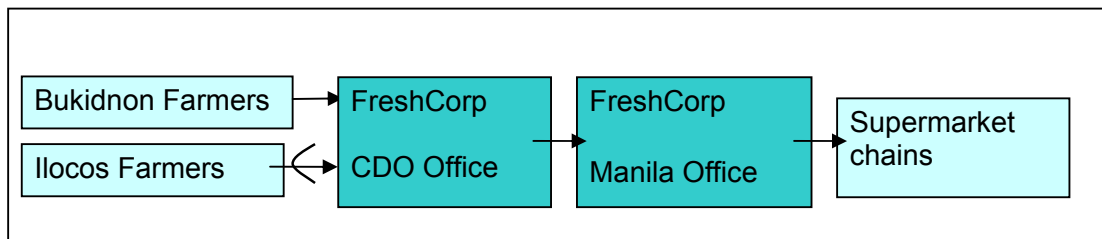
One of the bigger market specialists, Gomez Farms<sup>12</sup>, has a strong relationship with the biggest supermarket chain in the Philippines. Gomez Farms are the chain’s category manager. Several supermarkets have designated Gomez Farms as their preferred supplier and give them priority when purchasing fruit and vegetables to the extent that they protect them from suppliers who want to have a greater share of the retail business. In this type of relationship, supermarkets benefit because their preferred supplier will get them anything they need with the frequency and quality they require. Gomez Farms get produce from their own farm and from multiple sources including other vegetable consolidators, domestic suppliers and importers, in order to satisfy the supermarkets. This supply chain is modeled in Figure 3. The ability to source whatever product the supermarket needs gives Gomez Farms the edge over competitors.

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<sup>12</sup> Name disguised to protect the privacy of the company.

**Figure 3: Sample market specialist chain****Product specialist chain**

Apart from the traditional supply chain for vegetables, which used to be the main source of supply for the supermarkets, a specific chain has developed in response to the needs of this market segment (Figure 4). Tomatoes are grown in most parts of the Philippines, but more predominantly in the cooler regions like Bukidnon in Mindanao and Baguio in Northern Luzon. Tomato varieties suitable for the lowlands are also grown in lowland areas like Quezon Province, Ilocos Sur, Nueva Ecija and Batangas Provinces.

**Figure 4: Sample product specialist chain**

One such chain is managed by a large agribusiness corporation, FreshCorp<sup>13</sup>. FreshCorp has operations in Cagayan de Oro (CDO), Cebu City, Quezon City and Davao City. They source their tomatoes mostly from Bukidnon and Ilocos Norte farmers and control 15–20 percent of the supply of tomatoes in Metro Manila from July to December. They brand their tomatoes and all their other fresh produce. Their main markets are the supermarket chains in the Philippines. They sell upwards of 10 000 crates<sup>14</sup> of tomatoes per week during the peak season and 1 000 crates during the off season. They give assistance to farmers in terms of agronomic support, production advice and, in some instances, finance agricultural inputs. FreshCorp purchases from the spot market in Luzon and through marketing contracts with farmers in Mindanao. The seasonality of tomatoes is addressed by utilizing farmers from different regional areas. The Luzon farmers supply tomatoes from January to June, while the Mindanao farmers supply from July to November.

Tomato farmers in Mindanao who want to supply FreshCorp sign a marketing contract wherein the farmers commit to a specific weekly volume and a price ceiling. Such quantities are determined by the farmer himself. FreshCorp commits to sell for the

<sup>13</sup> Name disguised to protect the privacy of the company.

<sup>14</sup> A crate of tomatoes usually contains 23–25 kilos.

farmers the specified quantity and to a floor price. Deliveries and payments are weekly. Production scheduling is done by the farmers so that they are able to comply with the required regularity of delivery.

FreshCorp has around 20 farmers in Mindanao under this kind of contract. Each farmer cultivates 2–10 hectares of either owned or leased land. The high cost of transport from Mindanao necessitates the use of contracts. FreshCorp acts as the marketer for the produce and provides the farmers with the quality specifications of the supermarkets. Farmers pay FreshCorp a commission of 22.5 percent for their brokerage service.

Different supermarket chains have different purchasing arrangements with FreshCorp. With one supermarket chain, FreshCorp has a concession, and is responsible for filling the shelves with produce, cleaning, wrapping, replacing and bar coding. The supermarket earns its income from renting the shelf space as well as a percentage of sales. With other supermarket chains, FreshCorp has an outright purchase agreement where the buyer orders and pays after 7–15 days.

Because FreshCorp are able to control the supply of quality tomatoes to Metro Manila, they are reliable. Even competitors purchase tomatoes from them in periods of scarcity. They are able to maintain their relationship with the supermarket chains and to supply them with other items as well. Their ability to specialize in one product has opened the door and facilitated sales of other products.

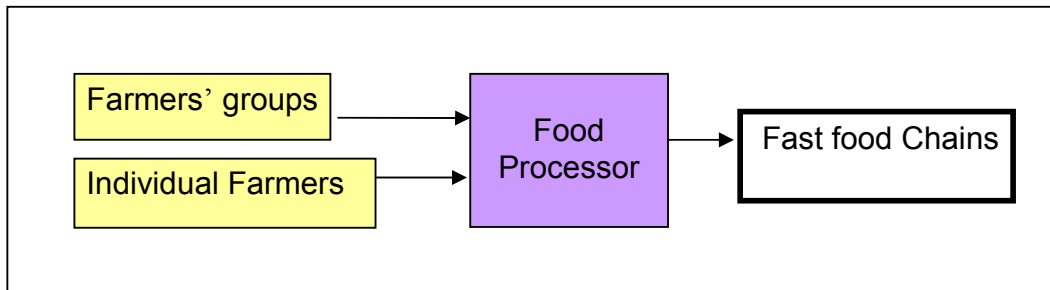
#### **Chain managed by a food processor**

The traditional vegetable chain has been the main source of supply for most restaurants and hotels in most parts of the country. In recent years, fast food chains have become the drivers for change. With the need to streamline their operations and cut costs, the fast food service operators no longer wanted to purchase unprocessed vegetables. Fast food companies increasingly turned to vegetable processors to supply their needs. They wanted to buy processed vegetables in the form of washed and cut salad vegetables and processed coleslaw. Their former suppliers, who used to be vegetable traders and consolidators, were therefore forced to adapt to meet their demands. Some of these traders went into vegetable processing. Suppliers who could not supply the required processed vegetables had to find processors who would become their new customers. In effect, farmers who used to consolidate and sell to the fast food chains, now find themselves excluded from the fast food market unless they can find a processor who will take their products. See Figure 5 below for a model of this supply chain.

An example of such a development is Great Taste Foods<sup>15</sup> (GTF), a food processor who supplies coleslaw to fast food chains. GTF sources their vegetables from Benguet farmers through the La Trinidad Trading Post. However, in order to secure a more reliable supply, GTF is now collaborating with several farmers' groups for the production of different varieties of lettuce for the fast food salads.

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<sup>15</sup> Name disguised to protect the privacy of the company.

**Figure 5: Sample food processor-managed chain****Development agency-assisted chain**

In many provinces involved in vegetable farming, non-government organizations have been assisting small farmers to market their produce. Some have succeeded, but many have failed either for lack of market knowledge, lack of marketing skills, or lack of familiarity with business functions. In an effort to improve the offer of quality, many have attempted to encourage farmers to market their produce collaboratively. These attempts have been done under the structure of an agricultural cooperative. While Manalili (2000) talks about the high failure rates, she also posits that cooperatives “by virtue of their size, technology requirement, and proximity to and knowledge of the area of production – are still the better option to service the marketing needs of small rural producers”. The key, however, “is effective management rather than the level of sophistication of the marketing system. Measures should therefore be geared towards enhancing cooperatives’ organizational management and operational efficiencies. Strategies should capitalize on competency-enhancing linkages that enable cooperatives to acquire the competencies of their partners while at the same time ‘learning the ropes’ of the business.”

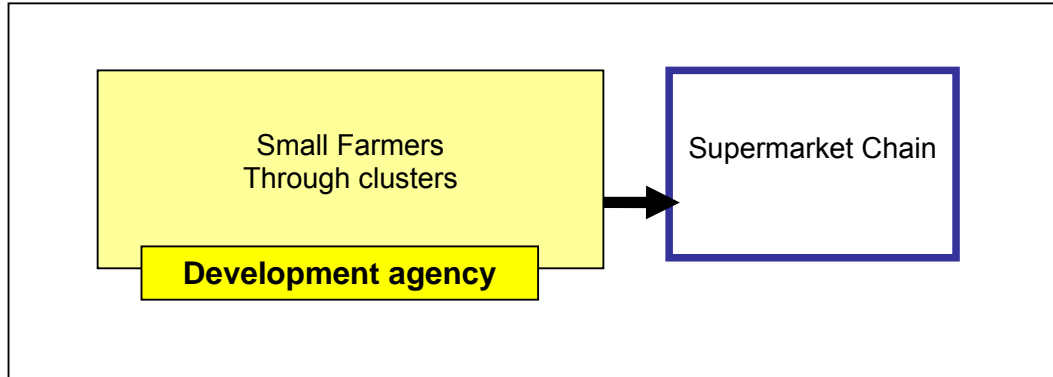
In a few vegetable chains observed, small subsistence farmers can only take an active role in the development of their farm as a business if the development agency assisting them empowers them to learn that farming should be viewed as a business, satisfying markets, taking financial risks, improving delivery systems and formulating enterprise plans. See Figure 6 below for a model of this supply chain.

One group of farmers in Maragusan has been assisted by the Catholic Relief Services (CRS) who have taught them the benefits of cluster farming. The development assistance strategy used by CRS was four-pronged, including agricultural extension, infrastructure, natural resource management and marketing assistance (Mendoza, 2006).

The marketing assistance was composed of basic marketing training, product selection, cluster formation, market visits, enterprise planning and trial deliveries. A cluster of five to ten farmers was formed in order to coordinate production, harvest and marketing activities. Consolidation gave them better access to markets and resource providers and lower transportation costs (Mendoza, 2006). The farmers themselves identified what products they were good at cultivating and how much volume they could commit to the cluster. If one farmer does not comply with the commitment, this farmer can be eliminated from the group by the other farmers in the cluster. A cluster leader with good

farming skills and the ability to lead is selected from among the members. Regular meetings are conducted to evaluate the lessons learned from each step the cluster makes.

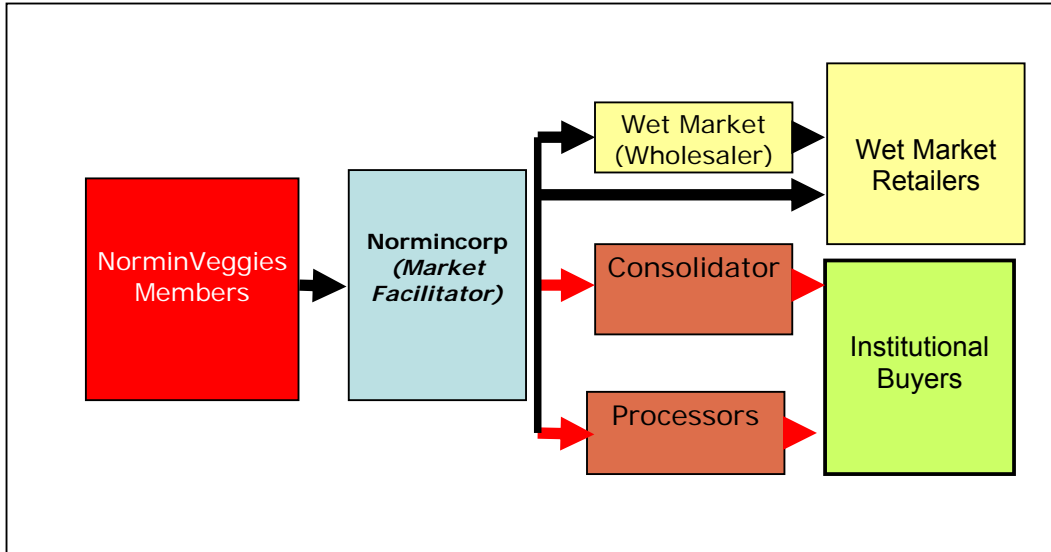
**Figure 6: Development agency-assisted chain**



### **Producer-managed chain**

In response to the challenge of accessing more stable markets, farmers from Northern Mindanao collaborated with each other to coordinate their production and marketing efforts. This group is called the Northern Mindanao Vegetable Producers Association, or NorminVeggies. As marketing clusters, they were able to achieve economies of scale in transporting produce, access development assistance from government and NGOs, share market intelligence, production and post-harvest technologies. The collective action did not stop at membership, but was implemented at different nodes of the supply chain from production, post-harvest, marketing and sales collections. They also established a private corporation (Normincorp) which acted as a marketing arm and charged a facilitation fee based on a percentage of sales. This marketing arrangement is very attractive to farmers because they retain ownership of their products right up to the end buyer or institutional market. They receive the revenue from the sale of their produce minus the facilitation fee (Concepcion *et al.*, 2006).

While most small farmers are unable to transform from being production-oriented to market-oriented, the members of NorminVeggies were able to do so. Many factors contributed to the success of this group. Firstly, their membership comprises of some large independent growers who are more educated, better trained and more financially independent than the typical Filipino small farmer. These independent growers took the initiative to lead the association, look for new markets and identify new ways of reaching these markets. Secondly, a non-government organization took care of the needs of the smaller farmers and assisted these farmers in making their decisions. Thirdly, NorminVeggies was able to access funds from development agencies because they were able to demonstrate that they had taken various initiatives to strengthen their organization and to develop their markets. See Figure 7 below for a model of the NorminVeggies supply chain.

**Figure 7: Sample producer-managed chain**

Fourthly, members of NorminVeggies set up a marketing arm for the association in the form of a corporation called Normincorp, managed as a business enterprise to service the marketing needs of NorminVeggies' members. Normincorp was able to sustain itself through the facilitation fees charged for produce sold. Finally, members of NorminVeggies consolidated their volume through a clustering strategy based on product and market fit. While membership in clusters is optional, farmers who are cluster members have an assured market and can command better prices because of the production protocols adhered to.

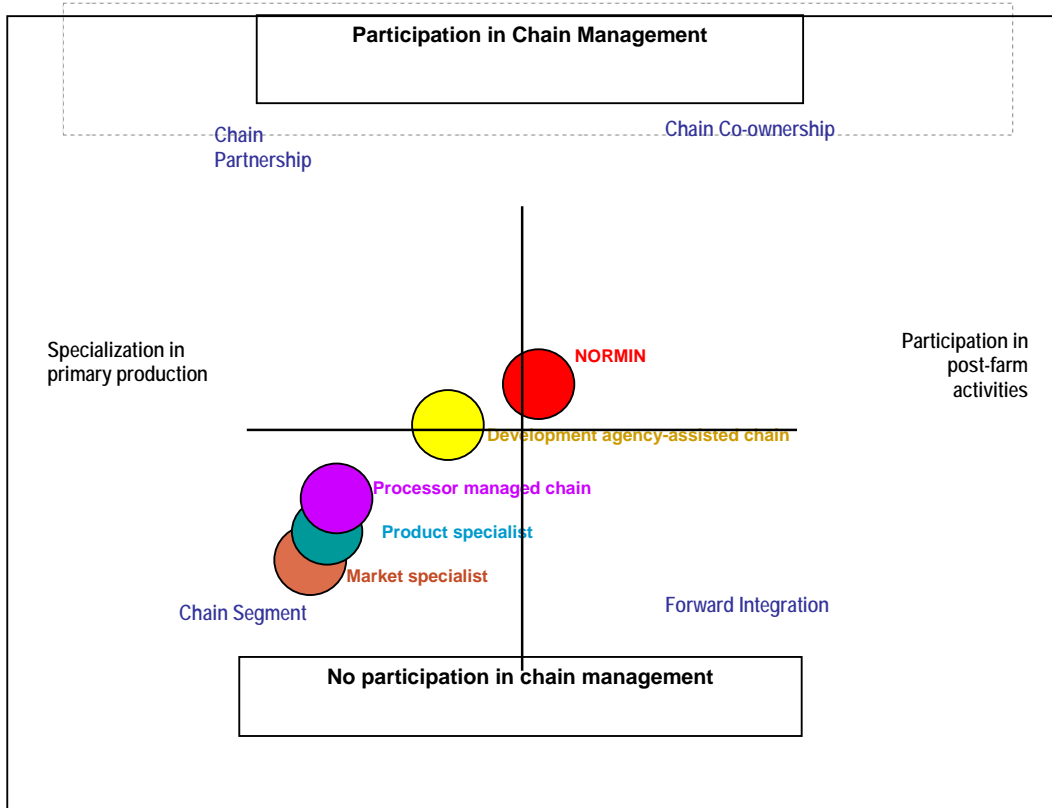
The clustering strategy enables small farmers to be active players in the supply chain, to meet the basic demands for volume and consistent quality, and to participate in dynamic markets like the fast food chains, processors and supermarkets. Members of each marketing cluster commit to certain agreements on volume and quality, follow production and harvest schedules, share techniques with each other, and regularly confer with each other on all supply chain issues.

### Conclusions

Five emerging chains have been described above and each of them includes small farmers to varying degrees. The evaluation of each chain on the basis of the degree of participation of small farmers in chain management and the small farmers' role in the chain is shown in Figure 8, using the framework proposed by Berdegué *et al.* (2005).

The market specialist chain does not provide the small farmers with any opportunities for involvement in any other role except primary production. This is the same situation in the product specialist chain and the food processor-managed chain. While these three chains link the farmers to modern chains, the farmers' relationship with the buyers remains essentially the same.

**Figure 8: Forms of inclusion**



The product specialist chain, however, gives the farmers an assurance of market because of the contractual relationship with the product specialist. Trust can be developed in this case when the relationship becomes more long-term. In the food processor-managed chain, the farmers still play the primary production function only. However, the requirements of the food processor in terms of quality and volume are made known to the farmer, giving them more intimate market knowledge and a more involved role in chain management than the previous two chains.

In the development agency-assisted chain, the small farmers are empowered to learn and to make their own decisions. They conduct rapid market appraisals by visiting their intended markets and talking to the buyers in supermarkets. In the traditional chain, the farmers have no knowledge of the market beyond the traders who buy from them at the trading post.

In the producer-managed chain, like NorminVeggies, the farmers participate in making decisions on price, volume and quality, for each of the institutional markets they supply, be they supermarkets, food processors or restaurants. The farmers have a deep involvement in the management of the chain and in the delivery of the products close to the ultimate user.

While we have examined the farmers' inclusion in the chain and participation in postfarmgate activities, an even more critical issue is to calculate how much marginal income the farmers receive in each type of chain. Further research should ask the question of how much additional net profit the farmer earns from inclusion in modern chains. It is not enough just to include small farmers in modern chains, but it is essential that their inclusion gives the farmers higher marginal returns. It is hoped that greater participation in the chain will give farmers a better share of the value created in the chain.

Presumably, if farmers are able to take a more active role in their own supply chains, it should be possible to change their position as price takers. However, in order to do this, farmers need to be organized, not just as individuals belonging to a group, but as a group acting as one entity. For this to work, several critical factors must be in place. The benefits or incentives of organizing are clear. Members should share a core value of helping each other and of galvanizing their efforts towards strengthening the organization. While incentives exist to organize and access resources, the organization cannot be strengthened if core values are not shared. Considering the volatility and the dynamism in modern chains, it is important that the organization should be a learning organization which continuously adapts to the changes in the market. Another key factor that reinforces the ability of the learning organization to respond to the changes in the market is the presence of managerial and leadership competence. The quality of people making strategic decisions is essential.

### Acknowledgements

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## Supply chain innovations in the Ecuadorian cut flower industry

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### Abstract

*The Ecuadorian cut flower industry exports nearly 70 percent of its production to the United States of America. During the 1990s and in early 2000, the Ecuadorian export cut flower industry expanded rapidly by exploiting a unique financial arbitrage opportunity provided by the combination of an American dollar-denominated export market, a rapidly depreciating local currency and an inelastic labour market. Ultimately, this resulted in a highly inefficient and complacent industry that had few incentives for firms to operate differently. However, the unanticipated dollarization of the Ecuadorian economy removed this arbitrage and confronted producers with not only American dollar-denominated product markets, but also American dollar-denominated factor markets. The result was that many inefficient firms exited the industry while those that remained were forced to change their production practices and business models dramatically. Firms began evaluating how they could capture higher farmgate prices by extending their reach closer to the final consumer. One of the critical innovations was the establishment of a fully integrated cut flower supply chain for roses involving growers, a grower-owned brokerage firm and UPS. Drawing upon an extensive data base constructed from structured and semi-structured interviews and participant observation, this paper empirically evaluates the factors that contributed to the development of a fully integrated grower-owned supply chain for export cut flowers and the diffusion of its impact on the entire industry. Specifically, we look at how the chain was devised and identify the key actors and their critical roles.*

### Introduction

In recent years, the increasing internationalization of agriculture involving the globalization of production and distribution through reduced trade barriers and eased restrictions on capital movement has created a highly competitive industry for producers. The cut flower industry is a case in point, specifically the American market which imports nearly 60 percent of the flowers consumed (ERS, 2004). For firms operating in this export market, their survival is based on whether or not they can successfully develop and adopt organizational structures that allow them to create and capture value continuously (Gow *et al.*, 2002). The problem, however, is that many cut flower farms are still producing homogenous products and struggle to understand how to capture value within these new dynamic markets. Consequently, few firms have attempted to implement the necessary organizational changes that are required to confront these changes and to capture added value within the market.

The Ecuadorian cut flower industry is no exception. Ecuador exports nearly 70 percent of its cut flower exports to the United States of America annually. During the 1990s and in early 2000, the Ecuadorian export cut flower industry expanded rapidly by exploiting

a unique financial arbitrage opportunity provided by the combination of an American dollar-denominated export market, a rapidly depreciating local currency and an inelastic labour market. Exporters profitably exploited the increasing exchange rate spread between the American dollar and the Sucre. The Sucre was depreciating at more than 50 percent per annum by the late 1990s and Sucre-denominated input costs quickly became insignificant, especially labour. This resulted in a highly inefficient and complacent yet highly profitable industry that provided producers with few incentives to operate differently.

Facing a severe economic and financial crisis, in January 2001, the Ecuadorian government unexpectedly dollarized the economy. This removed the previous arbitrage that producers had exploited and confronted them with the harsh reality of American dollar-denominated factor markets. With labour accounting for nearly 50 percent of production costs, their business structures were no longer economically viable. An alternative business model was needed. Inefficient firms were forced to exit, while those who remained had to change their production practices in light of the dramatic change in input prices (Blumthall and Gow, 2005).

For those firms that remained, they could either pursue productivity gap or opportunity gap initiatives, or both (Prahalad, 1993; Gow *et al.*, 2002). Most farms focused internally on productivity gap initiatives by improving labour and input efficiency surrounding their core competency in flower production. A few firms however attempted to pursue opportunity gap initiatives by identifying and developing new export business models that provided sustainable competitive advantage. In particular, a group of rose export farms saw the opportunity to stretch their current business models into a new market by leveraging their core production competencies to fill an unmet demand for high quality roses in rural America.

Leveraging the recent innovations in international distribution and Ecuador's competitive advantage in producing the world's highest quality roses, these growers recognized that they could capture higher farmgate prices by providing rural American florists with a personalized selection of high quality, long-life roses, delivered directly from the farm. Located at the end of a long and complex chain of interlinked but independent spot markets, rural florists were viewed by traders and distributors as a residual market on which to dump unsold product. Consequently, these rural florists commonly faced a monopolist distributor offering an extremely random range of highly variable quality roses at extremely volatile prices. Due to their remote locations at the end of the chain they effectively had little choice to accept or refuse what was offered. Recognition of this opportunity gap that rural florists could not access a consistent range of high-quality roses led to the critical innovation related to the development of a fully integrated cut flower supply chain for roses involving growers, a grower-owned brokerage firm and UPS for the logistics and transportation to supply rural florists in the American market.

Drawing upon an extensive empirical data base constructed from structured and semi-structured interviews and participant observation over the summers of 2004 and 2005, we analyse and evaluate the critical factors and drivers that led to the establishment of this innovative grower-owned business model for exporting cut flowers. We then

evaluate the business model's key components, diffusion and impact. Finally, we describe and discuss the lessons learned.

### **Methodology**

The responses of firms within the Ecuadorian export cut flower industry to dollarization has provided a unique case study (Stake, 2003) within a natural experimental design framework for analysing endogenous interorganizational firm innovations following idiosyncratic exogenous shocks. Recognizing the instrumental and exploratory nature of this research, we followed a grounded theory approach to problem identification and analysis (Eisenhardt, 1998; Straus and Corbin, 1994). This analysis draws upon approximately 60 unstructured and semi-structured interviews conducted with all of the relevant channel players from government officials, trade association and industry leaders, firm owners, growers, workers, exporters, distributors and other channel members. A translator accompanied every interview to ensure the interviewer or interviewee fully understood each question or response.

### **Distribution channel of Ecuadorian cut flower exports to the United States of America**

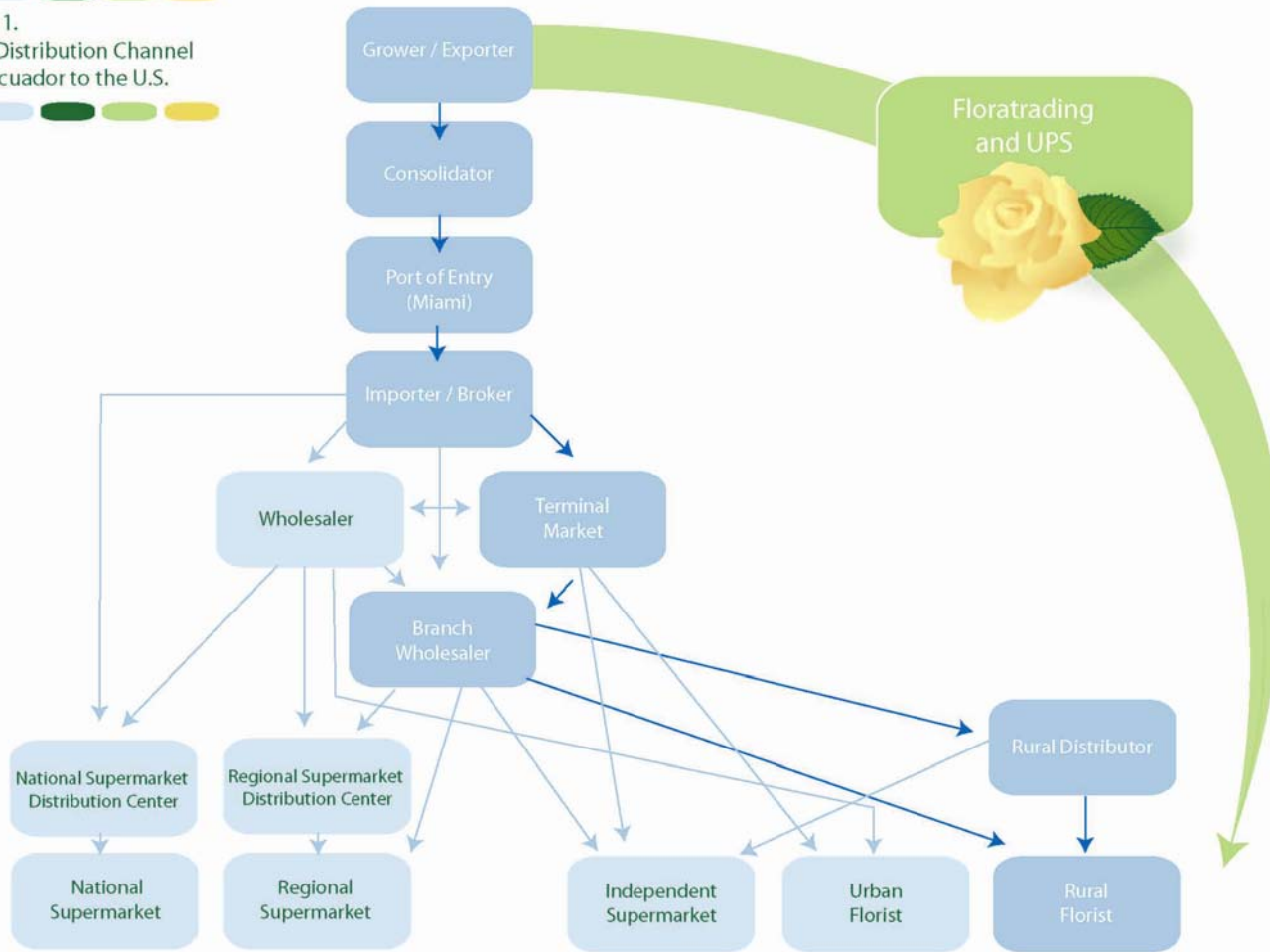
The general structure of the marketing and procurement channels for floral products in the United States of America for both domestic and imported flowers is shown in Figure 1. The number of alternative distribution, marketing and retail channel structures has increased rapidly over the past decade as consumers' disposable income has increased and, with that, the year-round demand for cut flowers.

The traditional product flow sees growers selling to an exporter who then consolidates and sells to an importer in the target country. Miami is the main port of entry for cut flower imports into the United States of America, receiving and processing between 80 and 90 percent of all cut flowers imported into the United States of America each year (van den Broek *et al.*, 2003 ). Other ports of entry include New York City and Los Angeles. These imported flowers are then sold: (1) via auction or spot market transaction at a main metropolitan centre terminal market; (2) purchased on consignment by a wholesaler; or (3) purchased on consignment or contract by larger retailers.

The wholesaler plays the role of the intermediary, consolidating both domestic production or purchases from importers and then providing an expanded offer to buyers. The wholesaler also communicates information regarding demand back to the growers. The wholesaler therefore occupies an important channel communications role: forwards to the retail florist and backwards to the importers and growers. Wholesalers may have several regional locations servicing major metropolitan areas and rural areas. For example, a large wholesale florist in Chicago may have a bonded import warehouse in Miami, a main warehouse in the city of Chicago, and several smaller branches in the suburbs.

Supply chain management

Figure 1.  
Floral Distribution Channel  
from Ecuador to the U.S.



As cut flower sales increase at mass merchandisers and supermarkets, importers are beginning to fulfil the wholesalers' traditional role of aggregating overseas product by selling product directly to these retail outlets. These firms can buy directly from importers because they require large quantities all year round. This provides them with considerable buying power which translates into lower prices per stem. Additionally, because they already have established distribution channels, they don't need the service that a wholesaler provides.

Urban retail florists usually procure their flowers directly from one of many large metropolitan wholesalers as they provide a range of services including one-source procurement, lines of credit, technical support and just-in-time delivery for special varieties of flowers. The florists have to purchase from what is available, which may or may not be the freshest product. It is only those retail florists that are large enough and can afford to order and plan in advance that receive the best quality product.

Rural areas are serviced by the large- to medium-sized metropolitan wholesalers and other rural distributors of cut flowers. The distance of these rural retail floral outlets from the wholesaler means they pay substantial premiums for the additional transport and marginal costs associated with moving flowers through such a long channel. In addition, it is extremely difficult for these florists to take advantage of the same just-in-time ordering and delivery options offered to metropolitan florists. The distance, volume, transaction costs and premiums involved simply make it prohibitive.

### **Impact of distribution on cut flower quality and market structure**

Cut flower quality is determined by a combination of the stem length, vase life and bloom appearance. Vase life is the longevity of the bloom in the consumer's home. This longevity is directly correlated to the quality of the flower at harvest and inversely correlated to the length of time that the cut flower spends in the distribution channel from grower to consumer.

Cut flowers can spend eight to ten days<sup>16</sup> in the wholesale chain before reaching the final consumer. During transit, almost all flowers are shipped via a cold chain however, numerous cold chain breaches may occur as ownership changes, thereby adversely affecting quality. Thus, as channel length and the number of channel linkages increase, flower quality decreases. Growers can ensure that the initial flower is of the highest quality through appropriate production practices, but traditionally neither the florist nor grower could control the channel length or number of linkages. This problem is particularly detrimental to vase life for florists and consumers at the end of long interlinked channels, especially rural florist and rural consumers.

The result is that urban retail florists in large metropolitan markets have greater sourcing, pricing and quality flexibility compared to their rural counterparts. Urban florists can source cut flowers from any combination of wholesalers, terminal markets or importers at a wide range of price-quality combinations that match their specific target market requirements. Urban markets have larger customer bases of both regular

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<sup>16</sup> Data is from a national retail grocery store chain and is from their distribution channels.

and impulse consumers, as well as more high-end consumers and corporate customers who regularly purchase cut flowers for events or special occasions. The result is that the urban cut flower market is highly competitive and offers urban consumers numerous alternatives to meet each consumer's specific needs.

Conversely, rural florists, often at the end of an extended distribution channel, can only purchase what remains in the wholesaler's coolers at that specific time, usually a very limited selection of marginal quality flowers. Consequently, rural buyers demand has declined dramatically over the past decade, as the quality of the consumer experience has suffered from a limited assortment of standard arrangements produced from marginal quality flowers with a short vase life. The result has been the slow and painful death of the rural florist.

### **Recent innovative channel responses**

Recent market innovations in the floral industry have focused on shortening the distribution channel while providing the final consumer with a broader and deeper offer. These innovations have generally been centred on two consumer retail interfaces: supermarkets and the internet.

Supermarkets and mass merchandisers over the past decade have leveraged their shorter and more efficient distribution channels and increased consolidated buying power to offer their customers a greater variety and quality of cut flowers. This development began with supermarkets offering just a basic assortment of loose flowers, bunches and potted plants. More recently however, urban supermarkets have begun competing directly with urban florists. Today, many urban supermarkets offer specialty in-store florists providing customers with both custom arrangements and a large assortment of cash-and-carry consumer bunches, thereby making the flower buying experience simple and convenient as well as more affordable.

Recognizing the opportunity to leverage their urban experiences, rural supermarkets have recently begun offering rural consumers both prearranged bunches of flowers at substantially cheaper prices or flowering potted plants. However, the long channel of distribution still causes some quality difficulties and in-store florists are still uncommon, but, as a result, rural florists are attempting to identify alternative distribution and procurement channels so that they can increase their assortment and the quality of their product offer.

The second innovation relates to the use of internet and rapid expansion of express parcel distribution services across the United States of America. Consumers can now browse through several web-based firms that sell floral arrangements over the internet and use FedEx or UPS as their distribution agents direct to the consumer's home. These web-based firms offer consumers convenience in urban areas and in rural areas they often offer better variety and quality than what the traditional retail florist can offer. The constraint with these internet-based firms is that they have a high minimum price, with most bouquets starting out at about US\$40<sup>17</sup> plus shipping and handling charges, with

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<sup>17</sup> Aggregate number based on current web-based offerings

not all delivery options available in rural areas. The other constraint is that the consumer is unable to observe the product prior to purchase.

The firms operating in the internet market space have differentiated themselves by targeting high-end consumers with a high-end product: domestically produced cut flowers in stylish arrangements and vases available at several different price levels. Other firms have targeted the mass market with a variety of internationally produced cut flower products with mid-range prices. Both of these groups of firms use the Internet to market pre-made and designed consumer bunches direct from the field via a distribution centre to the final consumer.

### **Market opportunity in rural America**

The main challenge rural florists face compared to urban florists is high information costs and high transaction costs that are derived directly and indirectly from supply chain problems related to the demand uncertainty and high temporal specificity (perishability) of the product and geographic remoteness. Only holidays, weddings and funerals are certain for rural florists. Flowers are a highly perishable product that has already substantially deteriorated by the time it reaches the rural florist. A large shrinkage and short vase life makes holding cut flowers for any period of time difficult. Finally, long multiple-linked procurement chains reduce vase life, resulting in substantial premiums from double marginalization and force the imposition of long lead times and limited product offerings. Thus it becomes extremely difficult for rural florists to plan and maintain a broad, high-quality and price-effective product offering.

With recent channel innovations focusing on the end consumer, there is an opportunity gap related to the marketing channel to the rural florist. Though “jumping” from the grower to the end consumer offers better pricing and selection, few innovations have targeted the retail florist. The retail florist still plays an important role in designing stylized arrangements for consumers especially for special events, weddings and funerals in urban and rural areas. Online vendors do not service these events well because of delivery lag time and packaging. Supermarkets are unable to provide the customized arrangements. Furthermore, rural florists do not have consistent access to a quality supply of cut flowers. Therefore, an opportunity exists for an alternative business model for growers to target rural florists.

Retail florists present an interesting target market because their business is built on reputation. This reputation is based on perceived design quality, vase life and the variety of flowers offered. Individually, Ecuadorian flower producers cannot correct the rural retail florists’ quality, variety and vase life problems as they do not have enough variety and volume or a suitable distribution channel to service these retail florists effectively. However, if the farms could be coordinated and identify a suitable distribution channel they could solve the problem collectively.

### **Business model innovation: Enrique Hidrobo and Floratrading**

This is exactly what one entrepreneurial farmer did: establish a collectively owned firm Floratrading to coordinate and manage the procurement, marketing and distribution of



Ecuadorian cut flowers to target rural retail florists in the United States of America. The concept was for Floratrading to offer rural American florists bundles of 200 stems of high-quality roses in a variety of sizes and a range of varieties and colours shipped direct to their door. Pricing would be competitive with the wholesale floral market prices however Floratrading would offer fixed year-round prices that included shipping and handling. Pricing would be determined by stem length. The one exception is Valentine's Day, where all prices increase for this holiday. The roses are delivered to the florist via the UPS fresh floral express service within 48 hours from the farms in Ecuador.

The key entrepreneurial individual behind this was Enrique Hidrobo, a medical doctor with a passion for agriculture. Over the years he had experimented with several domestic agricultural products, all of which failed to turn a profit. Only the export market was making profits and in the Ecuadorian highlands outside of Quito that meant only one thing: cut flowers and specifically roses. So in 1996, he began his first farm near Otavalo. He now operates two farms with some 15 hectares under production.

Rose farms in Ecuador produce high-quality long-stemmed roses. Individual farms produce around 30 to 40 different varieties. The market for cut roses however offers over 100 varieties to choose from so farms specialize in specific varieties.

The 2000 dollarization of the Ecuadorian economy hit the industry hard. Farms had to improve production efficiencies quickly or exit the market. Having already successfully exploited productivity increases in his markets, Enrique was closely watching the development of the American market, searching for new opportunities. Specifically, he had paid close attention to Calyx and Corolla and their success in shipping and selling flowers directly to the consumer via Federal Express. He was not interested in mimicking their innovative consumer-focused model as his farm only produced roses, however, the direct delivery freight system was intriguing and would only require minimal changes to his current practices if he could identify an opportunity gap. After scanning the environment, it was clear what would be successful: collective direct marketing of large bunches of roses to rural US retail florists.

The region outside of Quito produces high volumes of roses, lots of varieties, and high-quality roses. By collaborating, growers could easily provide sufficient product at the required quality to meet the anticipated demand. Additionally, there would be no changes to the product, production practices or packaging requirements to serve the retail florists, as they would offer the same standard 25 stems per bunch that they provide to wholesalers.

Coordination and market development would require a sales force and a variety of product offers to the florist. Essentially, growers would offer the same rose varieties and timeliness that wholesalers did, otherwise there would be no reason for florists to use them. This would be difficult alone, so he established Floratrading to coordinate the sales and distribution to American retail florists. Floratrading would provide the product faster than the traditional distribution channel by utilizing UPS as their sole distributor.

During Floratrading's inception, farmers were reluctant to accept the start-up risk, as dollarization had made them risk-averse. Furthermore, a collaborative industry culture was non-existent. Initially Enrique had to leverage his own farm to finance and supply the roses for the Floratrading venture. However, once Floratrading was established other farmers were no longer hesitant to invest in it. Today, Floratrading is privately owned by the growers who choose to participate. The main incentive is a higher farmgate price. Farmers pay a membership fee for entry that they will be able to recover from Floratrading once it shows a profit.

The roses are distributed to retail florists in the United States of America via UPS. Initially, UPS had no experience shipping flowers internationally and lacked the proper systems to ship fresh flowers. They were hesitant to develop such a service but were persuaded with the Calyx and Corolla business model and its success. Thus, they established the fresh floral express to act as the freight forwarder and distributor for Floratrading roses. The delivery service utilizes their 48-hour air freight services and delivers roses faster than the traditional chain. As a result of a shorter chain, fewer channel partners and less time in the chain, the roses have a substantially increased vase life for the consumer.

The next step was to establish a market interface. The increased consumer use of the internet coupled with Ecuador's inconsistent and expensive telephone service meant that a web-based customer interface was optimal. Customers could view the product offer and make purchases. Delivery of the product was based on the order date with one week as a required minimum for delivery time. Over the website customers could also contact sales representatives directly. Recently, Floratrading have implemented new technology that allows American customers to dial toll free numbers in the United States of America and be connected to the Ecuadorian sales representative's cellular phones. This technology has helped them overcome the telecommunications barrier.

Floratrading offers customers a set price all year round with the exception of Valentine's Day. For example, they have one price for 50 cm roses, and one price for 60 cm roses. They are able to offer this set price because they charge a toll fee as opposed to double marginalization that occurs in the traditional supply chain. This means they can increase farmgate prices up to the traditional wholesale price (minus the cost of transport) and still be competitive with wholesaler's prices.

Finally, in an effort to protect their new innovation, Floratrading began to brand their roses with the company's name on the shipping boxes to gain customer recognition.

### **Impact of the innovation**

The Floratrading business model has provided substantial positive benefits to both growers and American retail florists. Floratrading has successfully established a niche market with lesser serviced areas, which allow the farms involved to receive higher farmgate prices. Alaska was a market in which they had initial success due to its remoteness from major metropolitan areas. Although UPS needs 72 hours rather than 48 to reach the Alaskan market, the quality of the product florists receive is superior to that from their traditional supply chains.

To date, only one Ecuadorian imitator has piggy-backed the UPS services to the United States of America. Even though Floratrading developed the initial service, its increased use only improves the distribution channel and allows Floratrading to bear less of a cargo burden. Furthermore, only individual farms are using the model and they do not offer the same variety of cut roses as Floratrading.

Retail florists benefit because there were effectively no switching costs associated with moving to Floratrading, while it provided a substantially higher quality product with greater variety. The difference with Floratrading is that florists do not have the option of just-in-time delivery and must plan ahead on a weekly basis. This however differs little from requesting specific colours and varieties of flowers from a wholesale florist. The only other restriction is that retail florists must order in pre-set quantities of 75–100 stems (based on stem length), but they are free to select different varieties to fill each box. Therefore, Floratrading offers a very similar product offer to retail florists at the same prices but with a substantially increased vase life. The added benefit of the reduced distribution chain means that, if necessary, retail florists can hold the roses longer before they must use them.

### Lessons learned

**An entrepreneurial business leader was necessary for this innovation.** He provided the needed market and production coordination and saw the value in the opportunity when others could not. Additionally, he possessed the social capital and willingness to bear the burden of risk associated with the development of the distribution channel. However, in the end he wins, because his farm is a member of Floratrading and he receives increased profits as a result of higher farmgate prices.

**A real and existing market opportunity.** There was real money to be made and participating growers and florists have benefited from the innovation financially.

**The offering is mutually beneficial to all parties.** Florists receive a stable price and high quality product that is delivered faster than traditional supply channels. Growers receive a higher farmgate price and gain increased knowledge about their consumers. UPS wins because they have increased cargo business and can now compete with Federal Express.

**The business practices stay the same for rose growers.** There are no major hard asset changes or investments in joining Floratrading. The only change to the post-harvest process is the use of a different box. Depending on the grower, they may already be shipping their flowers in different boxes depending on their customers' needs.

### Conclusions

This instrumental case study analyses and evaluates the critical factors that led to the establishment of this innovative grower-owned business model for exporting cut flowers. The case provides a comprehensive understanding of the reasoning behind why the firms initiated the organizational and institutional innovation and how it was implemented. The dollarization of the factor markets coupled with an American-dollar

denominated export market were critical to provide the appropriate business environment and firm incentives for this innovation to occur. The results and impact provide an in-depth understanding of the critical factors required for success. By no means is this firm the only example of a successful business model which offers a sustainable competitive advantage, but it is a legitimate example of the success experienced by firms as a result of exploring new market opportunities. The success of this model is based firstly on entrepreneur's risk taking, coupled with collaborative industry culture and mutual benefit for all parties. The success is further strengthened by the appropriateness of the target market and the production quality and the timeliness of delivery.

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## Grower direct marketing of vegetables in the Philippines<sup>18</sup>

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### Abstract

*In the Philippines, the distribution of vegetables in the open market has been dominated by traders for some time. The traditional trading practice involves marketing intermediaries that are increasingly multilayered. It impacts negatively on both the grower and consumer. Many growers have become dependent on traders for capital. At the consumer end, the high price has made vegetables unaffordable to most low income households, compromising their health. In order to raise the income of growers and make essential food affordable to low-income consumers, the GTGF Food Corporation has embarked on an initiative to reduce the number of intermediaries between the grower and the consumer. In our current operations we process vegetables for our clients. Our company and the food service establishment constitute two intermediaries between the grower and consumer. To reduce the gap further, we will soon be marketing the growers' produce direct to households and consumer networks. We are helping to set up direct consumer markets. These will be comprised of establishments that cook food for their constituencies, like school canteens and hospitals. The initiative is integrated with campaigns for healthier lifestyle and increased consumption of vegetables among Filipinos. This will be good for growers, the food service industry and public health*

What you will see in the next 20 minutes is our experience on how to improve a food chain by integrating new ideas into our own trading system. Vegetables from the highlands and the lowlands are brought to urban centres every day in great quantities. Supply is year round, varied, and in great abundance. You would think people would get rich from growing and selling vegetables. Well, traders do, and some big farmers who are also into trading, but the majority of small vegetable growers remain poor. For them vegetable growing is not a source of stable income. They survive and continue to farm out of necessity.

Let me tell a story from the Cordillera, an autonomous region where I come from and where most of the highland vegetables in the northern Philippines are grown. Two generations ago, the marketing of highland vegetables was very simple. A local Chinese trader would pick up a load of vegetables from the roadside, bring the produce to Manila, sell it at some central market, and then return to give the farmers a share from the sale and to pick up another load. Then urban-based Filipino traders began coming up to the highlands, buying from the growers and selling to the wholesalers in the city. Soon these traders arranged for consolidators at the farm site. So the supply chain

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<sup>18</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management

became extended and multilayered: first the grower, then the consolidator, the trader, the wholesaler, retailers, vendors, and finally the consumer. As a result, the system depressed the price at the grower end and raised it at the consumer end.

Another factor that puts the grower in a disadvantaged position is that the traders also provide finance to the farmers who often lack the capital necessary to fund production. These traders then do the marketing for the farmers to ensure that they recover their investment. This practice gives the trader absolute control over the price that the growers receive for their produce. When the prices in the open market dive, the grower is unable to recover the cost of production and goes into debt to the trader–financier. Many growers have been trapped in this situation. Let us take note of the three major impacts of this trading practice: (1) the grower is totally cut off from the market system depriving him of the ability to influence its workings; (2) the grower has little control over his farming, his income and capital, and because of his need to depend on the trader for credit, farmers fail to understand the complexities of financial management; and (3) the value of vegetables at the grower end is often very low while the price the consumer has to pay may be two to ten times higher at the point of sale. This is very demoralizing for the grower. Finding the solution to these three undesirables poses a challenge. This challenge became the foundation for a grower-processor partnership which I and a cluster of growers now share.

My company, GTGF, is into processing vegetables for the major food chains in Metro Manila. Since I need a reliable supply base, I set up a working relationship with growers willing and able to meet my requirements all year round. Moreover, the produce must meet the stringent quality specifications of my customers. As we were working on this, the concern for giving the farmer his or her due compensation was utmost in our minds. For starters, we agreed on a fixed price for each crop for the whole year, while ensuring a fair mark-up. My partner growers acknowledged the advantage of this arrangement because they knew what they would earn for the year in contrast to the price uncertainty in the open market. Still, the allure of the occasional high price (jackpot) at the trading post remains and has proven to be the greatest hurdle to overcome. In this regard, the outlook and attitude of the farmers needed to be transformed. Not unexpectedly, the sincerity among partners was put to the test.

The plan with my partner growers is four-pronged: (1) to improve the efficiency of their farming practices and comply with the highest standards of farming, production programming, post-harvest procedures, packaging, sanitation, and increasing technical competence; (2) to develop a sense of business in order to be able to appreciate risk, opportunities and threats, for farmers to manage their farming activities as a business, applying sound business practice; (3) to make the growers' earnings reflect all the possible benefits due to them, recovering the cost of soil rehabilitation, land preparation, inputs, adequate compensation for labour, a subsistence allowance during the waiting period, partial payment in cash upon delivery of harvest, social security and other benefits for family members; and (4) to nurture social values which must underlie the first three objectives and pass the test of sincerity which alone will hold the partnership intact. The need to nurture and develop values or character; while this may not look as important as the first three, it is the most important. The values or the character of the people involved will either make or break our business and our partnership.

In most businesses, this issue is often given very little priority or otherwise disregarded. Because of this, when conflicts arise, the business struggles to move forward, because those involved do not share the same values. We know this concern from a lot of experiences. Realizing this, we have incorporated a value formation programme into our operations. Our desire is to help every person involved in our project, to value their work by giving value to their relationship with God and others. In order to do this, we have done the following. We are developing our value formation programme within our processing company. As we learn from this, we hope to deploy the programme to all our partners in the next two years. You know, we use the Bible as a reference, because it contains powerful lessons and examples of people of character whose values we would like our people to have.

In our programme, we do not touch on people's religious affiliations. Instead, we focus on striving to have one mind and one heart by sharing the same values. We have had encouraging results from this programme. The people in my company are more responsible to their tasks and cheerfully cooperate with those in authority. We see less theft and much more positive behaviour. Our workers have developed a sense of ownership for their work. From here, we hope we can extend the programme to our partners in the community that we work with.

With the prospect of a reliable year-round supply, based on our grower–processor partnership, I was determined to lead my company and dream to become the biggest vegetable processor in the Philippines. To the growers I brought into the partnership, I was their sole direct market. However, my needs for the processing business could not possibly absorb all the output of those who joined the partnership, which we wanted to be open to other growers. We needed to have a much bigger market. This implied that our partnership should not be limited to meeting my needs as a processor. We needed to enter a wider market: households and institutional food servers. We also wanted to tap into the export market and work towards being able to meet the requirements of global trading.

However, this grand scheme ran up against a formidable obstacle before it could take off the ground. My processing business was in trouble because the growers failed to accomplish the programming schedules and could not yet meet the quality specifications. Many could not resist channelling their produce to the trading post whenever the price there was high. Crop damage due to bad weather aggravated the problem, but the main concern here is more of pole vaulting. To have full control over my supply requirements, I had no recourse but to accede to importing my raw materials, but, at the same time, I did not want to give up on my partner growers and the grand plan for a massive direct grower market. So, for me to solve the dilemma, I decided to run my operations along two tracks; first, secure my supply through a combination of importation and corporate farming; second, continue developing the partnership with growers for part of my supply, while supporting the establishment of the grower direct market.

As progress is made on the second track, the need to import will eventually diminish and supply will be restored to the growers. In light of this vision, the advantage of the grower direct market has become more urgent, and a grower-to-consumer market which

is more direct than grower to processor became the focal point. In trying to sell direct to consumers, we ran into an astounding insight: why treat consumers as mere buyers? After all, it is their purchases that keep this industry going, isn't it? So why not consider them as business partners, for indeed the consumer in the act of buying is interested in fulfilling an immediate need, being able to purchase at a convenient outlet and at a fair price. We are all consumers, but how many of us have a long-term interest in sustainability or in reliable supply? Should we not as consumers seriously consider the sustainability of our food supply? In much the same way, the grower is concerned about being able to dispose of his goods in a convenient way and at a reasonable profit. He is also concerned about sustaining production since farming is his lifetime occupation.

These parallel aims provide a fertile ground for a business relationship and the social reasons for partnering. Their parallel concerns and common expectations make them the best of partners. Here then is a model, an option; we believe God is inspiring us to undertake a direct grower-to-consumer market with no single intermediary trader. No trading profit is added to the price that the consumer pays and there is no reason to depress the price at the grower end. I am not saying trading is not an option, but the effort of the farmer should be compensated and considered.

We are starting with a network of school canteens and institutions or community-based consumer cooperatives. These networks take a proactive role in promoting healthful living and healthy eating habits which mean less meat and more vegetables, which is good for us and for the food industry. The consumer networks take care of synchronizing and consolidating their purchase orders, organizing the delivery and distribution system, and the grower clusters and the consumer networks jointly shoulder the cost of shared services such as the use of complete cold chain transport and appropriate information technology. Initially, we are consolidating these consumer networks across the entire metropolitan area of Metro Manila. With this setup we believe we have found the way to solve the three major destructive conditions cited at the beginning. Under this setup, growers will have direct influence in the marketing system. Growers will have control over the management of their farm, income and capital, and be able to compete in the export market. Consumers and growers will be paying the price of vegetables which we seek domestically to make them affordable to ordinary low-income households.

The resulting increase in vegetable consumption will improve the health of my fellow Filipinos, and beyond physical well-being, we count on the social goodwill generated by the partnering as an additional social dividend. With the add-on traders' profit taken away, the economies of scaling should benefit the grower, transporters and consumers. Part of the imputed savings will be treated as a collective rebate to be used for projects of social significance such as reduced rates in malnutrition, infant mortality, maternal mortality, and elementary school dropouts. In this way, those subscribing to the direct market system will be supporting the attainment of the UN Millennium Development Goals in their respective communities.

The social partnering impacts another dimension which is to improve the local economy and save our farming sectors. We refer to these as reclaiming. We want to reclaim this kind of vision, because this was the nature of fair-trade that our ancestors practiced



before the advent of colonization. Social partnering will revive our ancient social bonds in our future communities. The caring business ecosystem created will be our contribution to restrengthening our nation. The same caring business system will nurture our commerce with other nations. This vision and mission is dedicated to the highest purpose as indicated in the name of my company, GTGF, which means and seeks to give Glory to God Forever. I share this vision and experiment with my fellow Filipinos and I am honoured to have been asked to share this with you today.

DELEGATE: At the beginning of your presentation you mentioned that farmers needed capital to start growing vegetables. How did you overcome this problem? Are you also providing capital to them?

MR BANIQUED: When we started this partnership programme, the money came from our own pockets at first, but when we saw that it was expanding massively, there was an increased demand for resources. We have a lending institution involved in a tripartite arrangement. Whenever the farmer needs the inputs, it is this lending institution who lends to them and we guarantee the payment to them. So, the money will revolve efficiently and effectively.

DELEGATE: How did your own farmers react when you started importing vegetables?

MR BANIQUED: My grower partners could not provide all the raw materials that my processing operation required. We must have a consistent supply base, but then a lot of problems began to arise. Firstly, the bad weather; and sometimes with the variable supply and demand, there was overproduction in a season; then there would be no supply. We cannot accept this and I don't want my company to fail just because of these things. I have to be more entrepreneurial and resourceful to maintain the relationship.

## **Agility in the Ghanaian international pineapple supply chain**

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### **Abstract**

*In recent years, the rethinking of the fresh produce business for export in less developed countries has become necessary due to increasing structural changes forced by customer-driven demand. Demand from developed countries is increasingly more sophisticated and is driven by issues such as technology, healthiness, ethical processes and products, food quality and assurance legislation. This has required stakeholders in the horticulture supply chain to be agile enough to respond to consumer demand. However, this imposes major challenges for suppliers of horticultural produce from less developed countries that have to respond to change quickly. Agility of an enterprise can be defined as the ability of an organization to thrive in a continuously changing, unpredictable business environment. From the supplier countries' perspective, the manager's ability to respond efficiently serves as a constraint and acts as a drawback from further development of the supply chain. Nevertheless, little research exists explaining the relationship between organizational agility, strategies and performance. In this article it is argued that the integration of supply chain into design and management decisions is critical to the formulation of an all-encompassing responsive strategy. The Ghanaian pineapple supply chain was analysed using a conceptual agility model. A survey was carried out with key importers in the United Kingdom and exporters in Ghana to test the bottlenecks and agility gaps in the pineapple supply chain. Agility gap ratios calculated for Ghana were considered high ( $\geq 60$  percent) implying most urgent change is needed.*

### **Introduction**

In the early 1980s, non-traditional food commodities appeared to offer sub-Saharan countries opportunities for export-led development, replacing the stagnation and decline in global market prices for traditional commodities. The world's increasing demand for exotic, out-of-season and semi-processed fruits and vegetables presented an opportunity for the production of tropical produce. This was the case of Ghana, a country located in West Africa whose economy highly depends on agricultural primary activities. In recent years, Ghana has developed its pineapple sector with a view to reaping the income generation opportunities in the export market seen in Ivory Coast and Costa Rica. Yet, Ghana is a small player in fresh pineapple fruit exports with 3.8 percent of the world market (FAO, 2004). The pineapple market is controlled by Costa Rica which accounts for 61 percent of the market, producing some 387 000 tonnes and is followed by Ivory Coast with 17 percent of the market share producing 183 000 tonnes.

Imports of pineapple to the European Union have grown at 4 percent rate per annum (FAO, 2004) with Germany, the United Kingdom and France being the top three

importers. This has been possible due to the strong British pound and the Euro exchange rates (CBI, 2005). Due to colonial links and geographical proximity African countries are important suppliers of fresh produce to the European market, but Ghana is a small player with 8 percent of the fresh pineapple export share, some €52.7 million.

Fresh Ghanaian pineapple is produced from relatively small and low technology farm holdings. Generally Ghanaian farmers are organized in producers' associations and channel their product to the export market via some sixty companies. Larger companies such as Jei River, Farmapine, Koranco and Prudent control over 50 percent of the export market (interview with GEPC, 2006). Fruit companies such as Farmapine usually source the fruit from a pool of up to five pineapple growing cooperatives, which in turn pass the fruit on to small and medium exporters. Conversely, the export of more value-added products such as fresh cut pineapple is carried out by the British-owned Blue Skies, the Dutch Tonggu Fruits and First Catering. These are specialist companies that supply to high quality retailers such as Sainsbury's and Marks & Spencer. Ghanaian farmers can also use export organizations such as the Sea Freight Pineapple Exporters Association of Ghana (SPEG) which coordinates sea exports or the Horticultural Association of Ghana (HAG) and Exotic Fruit Exporters Association (EFEG) that provide air freighting.

The Ghanaian competitors are characterized by three large transnational companies: Chiquita, Del Monte and Dole which control some 90 percent of the export market in Costa Rica. Moreover, the Ivory Coast situation is understood to be more similar to that in Ghana as it is typical of a large number of heterogeneous producers when considering farming unit size, the level of technology used and management practices. Nevertheless a couple of large operators such as Del Monte and Compagnie Fruitière also operate in that country. However, the main differentiating point in the Ivory Coast is the presence of Veritas, an independent certification body acting in the fruits terminal which inspects fresh produce for export on behalf of two major bodies: the *Organisation centrale des producteurs et exportateurs d'ananas et de bananes* (OCAB) and the *Société de manutention des produits agricoles* (SIMPA).

#### **Demand side: the United Kingdom case**

Historically, the fresh produce industry in the United Kingdom has lagged behind that of the manufacturers of fast moving consumer goods (FMCG) in its approach to marketing and merchandizing. Fresh produce has seemingly been downgraded by traders to the status of commodity. However, the sector has experienced major changes over the years that have changed the structure, conduct and performance of major players in the sector (Bourlakis and Weightman, 2004). Some 50 percent of fresh produce by volume in the United Kingdom was sold through retail outlets and the remainder was commercialized through the wholesale trade and for processing. More recently, supermarkets have accounted for an increasing share of the sales of fresh fruit and vegetables. This is possible because some 80 percent of the total retail trade in the United Kingdom is sold through supermarkets (IGD, 2005).

The single largest horticultural imported item is banana followed by apples. Fresh produce is imported and distributed by major players such as Albert Fisher, Fyffes and Geest. Nevertheless, for the case of the pineapple, *Compagnie Fruitière* and Del Monte

are the major players followed by Wealmoor Ltd and Capespan International. These importers have in-house distribution networks and warehousing facilities that have responded to growing retail demand (CBI, 2005). Fruit importers supply and tailor to the needs of supermarkets such as Tesco, Sainsbury's, ASDA/Wall-Mart and Morrisons by usually offering prepackaging and convenience. Some smaller and independent retailers as well as catering and restaurant companies rely on the wholesale markets such as the New Covent Garden and the New Spitalfields Market in London for their supplies. Whilst the retail marketing channel seeks, in relative terms, more quality over price, the wholesale sector tends to be more price-conscious than the modern retail channel.

In recent years, the fresh fruit and vegetables sector has experienced some changes due to new drivers that have come into play impacting the international horticultural supply chain networks (Fearne and Hughes, 1999; Dolan *et al.*, 1999). In the early 1990s Duke (1992) argued that continual and diverse changes in competitive strategies, consumer demand, environmental issues such as fossil energy, use of chemicals, fertilizers as well as labour and cultural values have contributed to significant structural changes in the United Kingdom fresh produce market. Following this, Fearne and Hughes (1999) proposed five key factors driving the transformation of the United Kingdom fresh produce sector as: supermarket strategies, food safety legislation, supply chain integrity, rationalization of the supply base and innovation. Bourlakis and Weightman (2004) have also confirmed the importance of the United Kingdom's market in promoting change that, according to Freidberg (2003) has been revolutionary on members of the fresh produce supply chain from sub-Saharan Africa.

On supermarket's strategies, Bourlakis and Weightman (2004) argue that the top three supermarket chains in the United Kingdom exercise such a dominating power that this has enabled them to demand from suppliers the kind of products that will bring the retailers high brand-name and high profits. Hence, high profits are achieved through increasingly new methods of marketing to consumers, realized by own-branding that ultimately enable the control of the supply networks. Thus, the growth strategies of the 1980s and mid 1990s, which had effects on product range and price competitiveness, have been replaced by strategies based on product differentiation.

In addition to that, the Food Safety Act of 1990 in the United Kingdom initiated a process of articulation and coordination in the supply chain. According to the Competition Commission (2000) retail buyers have taken extraordinary steps to ensure the safety of products they receive from upstream suppliers. The need to assure consumers has also redefined the boundaries of quality, from fit-for-purpose to include consumer values. This has brought the ethical dimension of production and consumption into perspective since attribute values such as care for the environment and labour welfare are now perceived as quality. Hence supermarkets look for greater increased coordination and control, but, yet, have no intention of extending ownership of the production activity (Dolan, 2000); retailer ownership starts from when the product arrives at their distribution centres. As a result, improved supply chain integrity and greater consistency coupled with the need to squeeze costs out of the supply chain has resulted in the rationalization of the supply base (Bourlakis and Weightman, 2004).

Retailers now seek to deal with fewer, larger, technically efficient and innovative suppliers.

The volume of fresh produce sold as raw product still accounts for the bulk of supermarket sales despite year-on-year growth in ready-prepared fruit and vegetables. Trienekens *et al.* (2003) observed that innovation in fresh fruit and vegetables is the major driver for value creation. As example, innovation in fresh produce sectors has taken place in the format of new varieties of sweeter, juicer, crispier and improved visual attributes, new formats of preprepared, mixed salads and stir-fry packs with extended life shelf, efficient production methods such as processing, storage, packaging, and the use of logistics. The use of innovation has been possible due to the substantial retail margins between raw and semi-prepared produce which is more attractive to retailers (Burt, 2000). However, the shortening of product life cycles and lead times for introducing new products using new technologies has reduced entry barriers and has triggered off a process of commoditization. Innovation is now the main commoditization driver which in effect keeps the fresh produce market growing (Bourlakis and Weightman, 2004).

The exporter's role in Africa has changed as a result of the changes in demand and as they attempt to meet the requirements set by retailers. Friedberg (2003) identified that African exporters had to work more closely with European importers so that changes in demand were transmitted to local growers in order to meet volume and quality requirements. Nevertheless, only a few large companies in Ghana succeed in providing enough rationalization. According to Simons (2000) what is needed is sufficient stability of products and practices for both buyers and sellers so that activities can be planned and decisions made rationally at prices which the markets clear. However, the use of formal contracts or fixed prices is not a common practice for Capespan International (interview with Capespan International, 2006), a feature also identified by Hughes (2001). African exporters despite having moved beyond the traditional trading role towards providing a broader range of services such as handling, expanding supply base and enabling compliance of assurance rules, are, as proposed by Gereffi and Korzeniewicz (1994), still characteristic of a buyer-driven global commodity chain linking sub-Saharan Africa to the United Kingdom. In order to understand better the limitations within the fresh pineapple supply chain in Ghana and to evaluate the actions needed to respond to changes in the market it is necessary to address the concept of agility.

### **The concept of agility**

The concept of agile enterprise appeared in the literature based on the realization that the pace of change in the business environment was accelerating and already outpacing the abilities of many established organizations (Iacocca Institute, 1991). Since then, as argued by Burgess (1994), many organizations have gained competitive advantage from the agile philosophy. Hence, the current pace of change in the business environment in the fresh produce export supply chain makes it imperative to investigate the application of this concept.

Yusuf *et al.* (2004) urge that it is essential that in the current business environment organizations continuously re-examine how they compete. Thus agility serves as the

underlying paradigm to enable organizations to reinvent the content and processes of their competitive strategy. In agility, therefore, lies the capability to survive and prosper in a competitive environment of continuous and unpredictable change by reacting quickly and effectively to changing markets. Van Oosterhout *et al.* (2004) argue that agility can be also defined as “the ability of an organization to thrive in a continuously changing, unpredictable business environment”. Moreover, agility could also be understood to be a way of coping with changes that are unpredictable or uncertain. These changes can be from the external and internal environments of the organization or the supply chain. Hence, dealing with uncertainty is about evaluating the effects caused by certain events happening. In the case of the fresh produce supply chain, it is about what the organization’s or supply chains’ response will be.

Nevertheless, the concept of agility is not complete without two other conceptualizations: flexibility and leanness. De Groote (1994) defines flexibility as a hedge against the diversity of the environment. This notion is complemented by Upton (1994) who proposed flexibility as the ability to change “with little penalty in time effort, cost or performance”, which takes place, according to Golden and Powell (2000), across four dimensions: temporal, range, intention and focus. In the quest for an all-encompassing concept of agility, Nilsson and Nordahl (1995), Sharafi and Zhang (2001), Towill and Christopher (2002), Wadhwa and Rao (2003) and Conboy and Fitzgerald (2004) observed that flexibility is a multi-dimensional and polymorphous concept whose simple, definition is “the ability to adapt to change”.

Yet, leanness is about the “elimination of waste” (Naylor *et al.*, 1999) and “doing more with less” (Towill and Christopher, 2002) to the extent where its ability to respond to change is not hindered. Nevertheless, Conboy and Fitzgerald (2004) argue that agility exhibits similar traits to leanness in terms of simplicity and quality. In this sense, the relationship of agility with flexibility and leanness as a collective application of the principles throughout an organization or supply chain implies a perspective of reconfiguring of resources aiming at the optimization of performance. Therefore, supply chain agility is about being able to change business and processes swiftly beyond the normal level of flexibility to manage unpredictable external and internal changes effectively. As it stands, agility can therefore be said to be a strategy that can be pursued in different management scenarios.

In developing strategies for horticultural chains, Thoen (2004) observed that horticultural producers adopt various strategies in order to survive and develop. These strategies are based on three key innovation aspects such as organizational, production and product. The basic underpinning of these innovations constitute of: (i) international horticulture disposing of a minimum set of tools either basic or advanced, either available by nature, location or by investment as well as new technical innovations which provide only marginal advantages; (ii) supply chain management streamlining unnecessary activities or organizations; (iii) traditional farmers and cooperatives being phased out and mainly entrepreneurs or corporate farms surviving from the international market; and (iv) the opportunities for horticultural entrepreneurs being limited by a combination of either export or domestic market orientation as well as focus on advanced or basic production factors.

In most fresh produce chains, the Ghanaian not being an exception, the fundamental assumption to strategic approaches is that what is required from re-engineering processes is readily available and can be accomplished by simply building flexibility into production systems. Palmer and Hartley (2002) mention that both resources and processes have to support the capability of being flexible and successful in a constantly changing world. Yet, Wadha and Rao (2003) argue that the real competence for success in supply chains is the ability to produce new products quickly and efficiently using available competences and to develop new ones wherever required, which the authors call Innovate-to-Order (ITO). Moreover, Taylor and Fairchild (2000) observed that Innovate-to-Order is leading to a situation in the global fresh produce supply chain where new products are engineered to meet specific needs in the market place by modifying the existing product, by developing new varieties or new hybrids to different product presentations. This has been observed in the pineapple case since the introduction of the Extra Sweet Gold–MD2 variety by Del Monte (Frank, 2003) which has replaced more traditional ones such as Cayenne and Victoria.

Most models developed for strategic analysis of sources of competitive advantage such as the Product–Market Portfolio, the Growth Share Matrix and Porter’s Value Chain do not measure the perceived gap existing between a supply chain and the market. Such a gap, understood as an agility gap, is calculated in terms of a ratio that works as an indicator depicting the urgency of the various change factors. Such an agility ratio is also a measure of the magnitude of the drivers. Nonetheless, it is necessary to elaborate upon agility metrics in any attempt to address and measure the difficulty or the extent of change related to the gap between the reality of the supply chain and what the market requires.

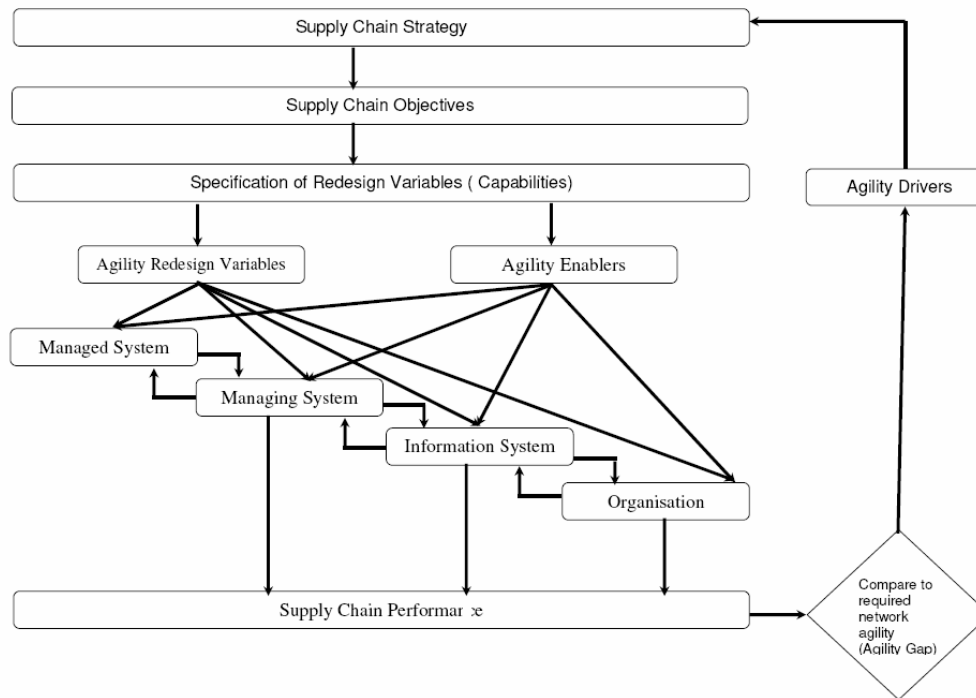
Agility metrics were derived as the responsiveness of an organization to factors of the business environment. It can be understood as the means through which an organization is proactively capturing the market and consumer needs and the extent it is taking advantage of unexpected opportunities. The responsiveness of a supply chain to these environment factors can be used as a measure of agility. Sharifi and Zhang (2001) proposed five business environment factor categories: social or legal; business network; competitive environment, customer needs, technology and internal changes. According to van Oosterhout *et al.* (2006) these are factors which require the whole supply chain to make adjustments. According to the authors other subfactors would affect only parts of a supply chain and at different levels and degrees.

### **Developing a conceptual framework for agile supply chain analysis**

In order to analyse the performance of the Ghanaian pineapple industry, Figure 1 below takes into account the relationship of the drivers of agility to the various components of the supply chain as proposed by Palmer and Hartley (2002). The framework presents change factors relating to: (1) the managed system, understood as the set of participants with specified roles in the supply chain and required infrastructure; (2) the managing system consisting of plans, controls and coordinates aiming at realizing logistical objectives; (3) the information system that supports decision making; (4) the organization structure relating to the setting up of tasks and necessary coordination enabling the realization of objectives; (5) specification of redesign variables (capabilities) that are the essential capabilities that the company needs in order to

respond positively to and take advantage of the changes; (6) agility gaps arising from when a business has difficulty in meeting the required level of agility for changing from one state to another in a timely and cost effective manner; (7) agility drivers which are internal or external factors influencing the required level of business agility that, according to Sharifi and Zhang (2001), relate to changes and pressures forcing companies to find new ways of running their operations to maintain competitive advantage; (8) agility enablers which are the means for a business to enhance its business agility; (9) supply chain performance as being the degree to which a supply chain fulfils end user requirements concerning the relevant performance indicators at any point in time, and finally, (10) agility redesign variable as a management decision variable at strategic level which determines the setting of one of the descriptive elements of the managed, managing, information system or organization structures.

**Figure 1: Conceptual framework for supply chain agility analysis**



Source: Adapted from Sharafi and Zhang (2001)

**Methodology**

The aim of this study is to test the applicability of the concept of agility as a strategic option to supply chain management in horticulture. Agility is used in other business management functions, but with not widespread use in agrifood chains. It is expected that the application of agility should improve supply chain performance and competitiveness of the businesses in Ghana dealing with fresh pineapple for export. The framework used for measuring agility in the Ghanaian pineapple supply chain was



based on a model developed by Sharifi and Zhang (2001) who have identified general factors in analysing the need of an organization to be agile. Two surveys were conducted where questionnaires were designed to capture the elements of the conceptual framework. Using a Likert-5 scale, agility gaps were scored regarding the probability of substantial change of the agility driver. Corrections of bias of order effect and acquiescence were considered with the negative side of the scale placed on the left as well as two-stage questions to counter the bias of central tendency (Brace, 2004). For each agility gap the respondents were asked to elaborate on the bottleneck(s) and measures taken in respect of the agility gap. The questionnaire generated both quantitative data on the agility gaps as well as qualitative data on agility bottlenecks and enablers.

Survey One (S1) was aimed at the Ghanaian pineapple export side. It consisted of twelve questions divided into three sections referring to information on the company, external and internal change factors. S1 respondents were asked their opinion on 503 issues. A sample of 62 companies was selected from lists furnished by the Ghana Export Promotion Council (GEPEC), the Federation of Associations of Ghanaian Exporters (FAGE), SPEG and HAG. Some 100 questionnaires were sent electronically to different management staff of the selected companies. The criteria used for the selection of exporters were based on the number of years in the export business. A minimum of three years was considered adequate. A telephone call followed up the initial correspondence to ascertain the initial criteria. This has enabled the sample to be reduced to thirty-seven valid companies, of which only nineteen replied. Survey Two (S2) targeted importers and wholesalers of fresh pineapple in the United Kingdom. S2 followed the same questionnaire structure as S1, but consisted of nine questions testing some 146 issues. Ten companies were selected based on initial Ghanaian's exporter's contacts mainly in the London Spitalfield market. Prior to sending the questionnaires to importers, a telephone conversation attempted to ascertain whether the company selected was directly involved in the import business. Only four companies qualified of which two replied: *Compagnie Fruitière* (UK) Ltd and Wealmoor UK Ltd. Follow-up meetings with some key respondents and in-depth semi-structured interviews were carried out.

The questionnaires were analysed and the agility gap ratio calculated using model formulae proposed by van Oosterhout *et al.* (2006) to check the urgency of the various change factors and the magnitude of the drivers:

$$Agility\ Gap\ Ratio_i = 4 * \left[ \frac{\sum_{j=1}^m \left( \frac{\sum_{k=1}^l P_{ijk}}{l} \right)}{m} \cdot \frac{\sum_{r=1}^t \left( \frac{\sum_{q=1}^s e_{iqr}}{s} \right)}{t} \right] \%$$

The parameters used refer to  $p_{ijk}$  as the probability of business change;  $e_{iqr}$  the difficulty to achieve business change;  $i$  the change factor requiring agility concerned;  $j$  the

company surveyed; k the individual respondent from company j; l the number of respondents from company j; m the number of responding companies; q the company of the respondent who responded to the survey with one or more individual respondent scoring  $p_{ijk}$  with a high score of 4 or 5; r the individual respondent from company q scoring  $p_{ijk}$  with a high score of 4 or 5; s the number of respondents from company q scoring  $p_{ijk}$  with a high score of 4 or 5, and t the number of responding companies with an individual respondent scoring  $p_{ijk}$  with a high score of 4 or 5.

The results were interpreted according to a scale developed by van Oosterhout *et al.* (2006). The agility gap ratio was scaled to a number between 0 percent (no gap at all) and 100 percent (largest gap possible). The higher the agility gap ratio percentage, the more urgent the agility gap. According to van Oosterhout *et al.* (2006), if businesses find it difficult to cope with major changes, which go beyond their normal level of flexibility, they are faced with an agility gap. Furthermore, change factors requiring agility that have a high probability (a score of 4 or 5), and indicate a high difficulty to cope (a score 4 or 5) create an agility gap. The gaps can be ranked, as follows:

- Most urgent gaps: ratio  $\geq 60$  percent (implies most urgent change needed);
- High urgency gaps: ratio  $> 50$  percent and  $< 60$  percent;
- Lower level of urgency: ratio  $> 40$  percent and  $\leq 50$  percent.

## Results

As seen in Table 1 below, the Ghanaian supply chain recorded 24 agility gaps spanning all the six change categories.

**Table 1: The agility gap ratios for business change factors (percent)**

Business Environment Change Factor Categories	Ghanaian Pineapple Supply Chain				Average agility ratio per change factor category
	Managed System (infrastructure)	Managing System (management)	Information System	Organization	
Technology	62.11	55.38	59.60	49.47	64.37
Customer Needs	66.78	65.81	64.92	62.23	64.94
Competitive Environment	65.62	65.33	66.85	63.87	64.63
Business Network	61.84	56.47	63.19	59.05	64.05
Social or Legal	64.40	60.37	58.57	55.22	55.65
Internal	66.12	68.31	63.47	63.44	64.52

The highest individual agility gap calculated relates to “management system requirement for certification schemes” with a ratio of 80 percent. Other change factors, also within the “most urgent” category, presented high ratios of 64 percent, these are:

- Technology – perceived as the increased need to improve connection to information systems and requirements for cold chain technology;

- Customer needs – characteristics of increased demand for customized products, customer's quality expectation, shifts in consumer tastes, sudden changes in quantity of orders and specification, increased need for quicker delivery time, increasing need for quicker response to importer's request, and increased customer demand for evidence of environmental friendliness;
- Competitive environment – typical of increased introduction of new varieties, shrinking margins, increased number of producers, increased cost of doing business as a result of compliance requirements in the supply chain, increased consolidation of competitors and the narrowing of the supply base by importers;
- Business network – is affected by changes in partnership arrangements in competing supply chains and increased influence of strong export companies on importers (imports category management);
- Social or legal – basically driven by ethical trade requirements.

Five other change factors presented agility levels characteristics of lower level of urgency with agility gap ratios of 48 percent. At this lower level of urgency could be identified change factors related to:

- Technology – new forms of transportation;
- Competitive environment – increased number of producers–exporters and use of economies of scales by competitors;
- Business network – cost and benefit compliance with network requirement;
- Social or legal – food assurance regulations and certifications.

Conversely, the Costa Rican pineapple supply chain revealed agility gaps in five factors spanning from three change factor categories. These are related to social or legal, business network and customer needs. Ethical trade requirements in the social or legal category presented an agility gap of 64 percent (most urgent). In the business network category, evolving marketing standards in importing markets requirement presented an agility gap of 48 percent (lower urgency). One of the respondents, *Compagnie Fuitière*, commented that this could be attributed to them already dealing with certified exporters as partners. Moreover, competition from multinational competitors resulted in a gap ratio of 64 percent (most urgent). Changes in requirements of importers or consolidators and sudden changes in order quantity as well as specifications were also identified as affecting the operation in the supply chain at 64 percent ratio. This indicates that businesses in Costa Rica are finding it very difficult to cope with immediate and major changes.

Moreover, the Ivory Coast supply chain recorded gaps in four factor categories: social or legal, business network, customer needs and internal organization. Ethical trade requirements and labour legislation create an agility gap ratio of 64 percent (most urgent) with food assurance regulations at 48 percent ratio. In addition, evolving market standards in importing markets, changes in requirements of importers or consolidators and competition spanning from multinational companies accounted for agility gaps of 64 percent. The increased need for a quicker response to importers' requests also showed a gap ratio of 64 percent.

## Conclusions

Few studies on international fresh produce supply chains from developing countries have addressed issues of agility and the potential for supply chain strategic performance improvement. It is possible to conclude that agility is a relevant strategy to pursue in view of the continual developments due to environmental change factors in the Ghanaian horticulture export supply chain. Results of the survey (S1) in all the 61 change factors tested recorded agility gaps at varying levels of urgency. The results of survey (S2) corroborated with the findings from S1 that indicate the Ghanaian supply chain as the least agile of all the three competing chains in the study. Since the study considered the entire pineapple supply chain, the identified agility gaps provide invaluable resources for managers to act upon variables and enablers, thus redesigning entire processes or series of processes across functional areas. These integrated variables offer more control over the supply chain since key stakeholders have measures reflecting actions across a number of functional areas. Collective effort is the way forward to overcoming individual constraints.

Results from the two surveys show that the framework is a valuable tool to understand international supply chains such as the fresh pineapple export chains of Costa Rica, Ivory Coast and Ghana. The framework is also valid at company level such as the case of Compagnie Fruitière (UK) Ltd and Wealmoor UK Ltd. Such a framework to evaluate agility can be replicated in many other sectors and industries as it serves as guide for managers to identify agility gaps in order to improve competitiveness. It also works well as tool to address strategic issues such as the conditions of market access, market channel selection and diagnosis of current and future conditions in fresh produce supply chains. It is expected that the application of agility should improve supply chain performance and competitiveness of the businesses in Ghana dealing with fresh pineapple for export.

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## **Jointly managing cut flower–vegetable production systems in Benguet Province Northern Philippines**

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### **Abstract**

*The Filipino cut flower industry is one of the country's sunshine industries. It is regarded as a good area in which to invest as cut flower production is less land-intensive and produces high value products. The Philippines' competitive advantage is attributed to an ideal climate for year-round cultivation, the availability of land and production technologies, competitive wage rates, proximity to major importing countries in Asia-Pacific and active floriculture associations and cooperatives. The cut flower industry in Benguet province, Northern Philippines, has undergone a remarkable transformation over the last seven years when production began to increase with the domestic demand. The growth of the domestic market was brought about by the increasing number of middle- and high-income classes, changing consumer preferences, and the expanding institutional demand driven by the growth of tourism. Consequently vegetable growers began to shift to cut flower production. Benguet is now the major producer of rose, chrysanthemum and gladiolus in the Philippines. This paper documents how organized cut flower growers jointly manage their cut flower–vegetable production systems. The case group is the Valley Cut Flower Growers' Association. This group, together with two others, was linked by the municipal government to a large multinational agribusiness for contract farming of vegetables, initially fancy lettuce and cherry tomatoes. It was driven by corporate social responsibility and the need to have a buffer crop in case something went wrong with their production programmes. Having stringent product quality requirements, the firm provides technical assistance for the producers in terms of good agricultural practices, aside from providing the seeds. The growers, on the other hand, are mostly cut flower producers who commit a portion of their greenhouse area to produce vegetables. Keen to fulfill their commitments to the firm, the growers have set up their own enabling mechanisms like regular meetings for production planning, information and technology sharing, problem solving and coordination. The challenges seen within this case include how the growers within the case association and among the two other groups work together to meet the volume and quality requirements of the buyers in order to maintain a lasting business relationship and how the local government unit provides the necessary policy support and business environment for both the producers and the buyers.*

### **Introduction**

The Filipino cut flower industry is one of the country's sunshine industries. It is regarded as a good area in which to invest since cut flower production is less land-intensive and produces high value products. The Philippines' competitive advantage is attributed to an ideal climate for year-round cultivation, the availability of land and



production technologies, competitive wage rates, proximity to major importing countries in the Asia-Pacific, and active floriculture associations and cooperatives (Philexport, no date).

Benguet province is situated in the southernmost part of the Cordillera Administrative Region, which is 250 km north of Manila. Ninety-six percent of the ecozones in Benguet are identified as cool highlands which are described as having various slopes with elevations of more than 500 meters above sea level and a temperature of 22.5°C or less. Soil types include sand, loam, clay, sandy loam, clay loam and undifferentiated mountain soil. The diversified soils make it possible to grow a variety of agricultural and forestry crops in the province (Benguet PPDO, 2003).

The cut flower industry in Benguet Province has undergone a remarkable transformation over the last seven years when production began to increase in response to the domestic demand. The growth within the domestic market has been brought about by the increasing number of middle- and high-income classes, changing consumer preferences, and the expanding institutional demand driven by the growth of tourism (DA-BAR, 2004). Consequently, vegetable growers are shifting to cut flower production. Benguet is the major producer of rose, chrysanthemum and gladiolus with 56 percent, 59 percent and 84 percent respectively of the Philippines' cut flower production in 1999 (Benguet PPDO, 2003). There are some 350 ha devoted to cut flower production in Benguet Province. Of this area, 109 ha are under greenhouses. Almost two-thirds of the total production area or 259 ha is located in the municipality of La Trinidad, the capital town of Benguet (CARAT, 2006).

Chrysanthemum is the major cut flower grown in Benguet followed by rose, anthurium and calla lily. Minor cut flower crops include gladioli, aster, shasta daisy, gypsophila, carnation and gerbera. According to Hermano (2003), roses were grown earlier than chrysanthemums in Benguet, but the more rapid adoption of appropriate technologies and the introduction of improved chrysanthemum varieties by a large local flower grower and integrator in the late 1990s saw chrysanthemum overtake roses. In 2001 to 2003, however, overproduction of chrysanthemum has been observed, causing the prices to decline (CARAT, 2006; Hermano, 2003). Likewise, cut flower production technologies applied in the lowlands further flooded the market. As productivity increases across an entire industry, producers often find to their dismay that prices have declined (Batt, 2004).

Acknowledging the contribution that cut flower production makes to the economy, the government is actively supporting the cut flower industry. Aro (1999) reported that the industry was classified as a potential export winner in 1994. An interagency task force was organized and one of its significant outputs was to focus on policy advocacy for the government to implement relevant rules such as the free movement of planting materials and reduced tariffs for inputs. The Department of Trade and Industry, through the Bureau of Export and Trade Promotions and Center for International Exposition, supports marketing and promotion through trade fairs which include the cut flower sector. The Department of Agriculture and the local government units from the provincial to the *barangay* level also manage trade fairs and conduct seminars for

growers. The Department of Labor and Employment also funded a cool-store for one cut flower association in La Trinidad.

Meanwhile, the issues that need to be addressed include networking among producers, the establishment of plant propagation nurseries, strong financial support from the government and the private banking sector, the provision of an efficient transport system, the establishment of integrators or flower distribution centres and strong research and development networks (Aro, 1999).

### **The Valley Cut Flower Growers' Association**

The Valley Cut Flower Growers' Association was organized in 2000 as an offshoot of a basic skills training course on cut flower production held at the Agricultural Training Institute at Benguet State University. This training course was conducted by cut flower production experts from Israel and the Philippines. There were 54 members at the start, but only 15 members are active at present. The founding president still holds the position in addition to other community work that he is doing. He is the chairperson of the Municipal Agriculture and Fishery Council, secretary of an irrigators' association, and vice-president of the La Trinidad Growers' Federation. He shares his farming techniques with other cut flower growers and serves as resource speaker in many seminars on cut flower production for which he received recognition as Magsasakang Siyentista (farmer scientist) and an Achiever Award by the Highland Agriculture and Resources Research and Development Consortium and the provincial government of Benguet, respectively.

The experiences of the Valley Cut Flower Growers' Association members are discussed in the succeeding portions of this paper. Two cut flower–vegetable growers in La Trinidad who are not members of the association were also interviewed as a benchmark. The paper illustrates the activities of the growers as part of an integrated cut flower chain and the relationships of the growers with other members of the supply chain.

#### **Farm organization and management**

All the cut flower farms in Benguet are jointly managed by the family with the husband as the main operator. For one grower, his wife manages the nursery. For the rest, their wives assist in all the farm activities including marketing. Two or three have hired regular workers who stay on the farm and are paid from PhP2 500–4 000 depending on their length of stay. During land preparation and harvesting, additional labourers are hired on a daily basis. The growers' children also help whenever they are free from school.

Most of the growers have a college degree and most are former overseas contract workers. The growers claimed that reaching a higher level of education is important since one can easily learn technologies, experiment and keep farm records. Their savings from their earnings abroad were used as initial capital for their enterprise.

In terms of farm size, the growers are classified as large, having more than 1 000 m<sup>2</sup> of land area planted. A study by the Foundation for Resource Linkage and Development (FRLD) indicated that major growers, integrators and key informants interviewed in

different provinces in the Philippines suggested that farm size be measured according to the number of plants for orchids and anthuriums, and according to land area planted for roses, chrysanthemums, gladioli and heliconias (FRLD, 1993). Therefore, in the case of chrysanthemums: small farms are 500 m<sup>2</sup> and below, medium-sized farms are 501–1 000 m<sup>2</sup>, and large farms are more than 1 000 m<sup>2</sup> in area. The growers view having a large farm area as advantageous for production programming and crop rotation.

### **Production management practices**

The growers started their farm enterprises with rose, anthurium or carnation. All of them reported that they had good yields in the first five years of straight cut flower production and did not have any major pest and disease problems. However, after this initial period they noticed a decline in their yield because of deteriorating quality of planting material and greater occurrence of pest and diseases outbreaks. The latter is the main reason why the growers began to rotate cut flowers with vegetables. Vegetable crops rotated with chrysanthemum include lettuce, broccoli, celery, Chinese white cabbage, tomato and bell pepper. One grower, however, noted that tomato and bell pepper are not good for rotation since these are also prone to fusarium wilt. The FRLD (1993) reported that crop rotations are practiced by growers in Benguet for reasons such as: (a) it takes two to three months to prepare planting materials; (b) steady income; (c) soil fertility will improve; and (d) integrated pest management can be performed, which involves biological and cultural controls.

Later on, the growers discovered other advantages in cut flower–vegetable production. One grower said that the two crops complement each other in terms of providing income for the grower. For instance, if the cut flower production in one season does not yield enough profit, the vegetables may do so in the next crop. Another grower claimed that cut flower production is more profitable compared to vegetables thus, during lean months, his revenue from cut flowers can provide for his family's basic necessities and daily expenses. In addition, the growers also get income from selling chrysanthemum planting materials at PhP1–1.50 per piece. Generally, growers propagate their planting materials from mother plants. They also buy from other growers in case they fall short of the needed quantity of planting material.

A production programme is followed by the association member–growers. Each member maintains a planting and harvesting calendar in coordination with the other growers in order to meet the requirements of their buyers and to take advantage of bulk delivery.

The cultural management practices required by cut flowers and vegetables are closely followed by the growers who constantly update themselves with new technologies by attending workshops and by experimentation. For the contract growers, technicians of the contracting firm assist the growers from time to time.

### **Marketing**

The association members sell their cut flowers directly to flower shops in Dimasalang, Metro Manila. These flower shops supply institutional buyers and consumers. A trucking firm delivers the cut flowers to the flower shops at a preferential freight cost. Dimasalang has grown in popularity as a flower market due to the presence of Dangwa

Transportation Company, for its bus station is located at Dimasalang Street. Buses from Benguet deliver fresh blooms on a daily basis (Vanzi, 2003).

One of the members delivers his cut flowers directly to the contractor's warehouse. He is paid after all the deliveries for the cropping season are completed, which is usually after a month's time. Otherwise, postdated checks are issued to him after every delivery. His reason for remaining as a contract grower is the assurance that his cut flowers will be bought and that he can plan ahead for the rest of his crops. This grower revealed that the contract growing arrangement in the past was far more profitable because the contractor used to provide good quality planting materials and required a greater volume of cut flowers.

For the non-members, their cut flowers are sold in the Dimasalang market or in Baguio City depending on the price. Communication technology and the presence of relatives who are traders in Metro Manila allow the growers to access price information.

The vegetables for all the growers are sold in the Baguio City Hangar market and the La Trinidad Vegetable Trading Post. Some sell to consolidators and food processors who supply institutional buyers in Metro Manila and nearby areas. One grower's wife is a vegetable wholesaler-retailer and thus handles the marketing of their produce. This scenario where growers are also vegetable or cut flower traders is common amongst Benguet farmers.

#### **New vegetable contract growing arrangement**

In August 2006, the Municipal Mayor of La Trinidad, invited a large multinational agribusiness firm to undertake contract farming with vegetable growers in Benguet. The firm is a major vegetable producer and consolidator with an established brand name. Driven perhaps by corporate social responsibility and the need to have a buffer crop in case something went wrong with their production programmes, the firm was enthusiastic in supporting a mixed cropping enterprise. Having stringent product quality requirements, the firm provides technical assistance for the growers in terms of good agricultural practices, aside from providing the seeds. The growers, on the other hand, commit portions of their greenhouse to produce the volumes of vegetables required. Keen to fulfill their commitments to the firm, the growers have set up their own enabling mechanisms like regular meetings for production planning, information and technology sharing, problem solving and coordination.

The contract prices for two vegetables, fancy lettuce and cherry tomatoes, were set after a series of consultations among the growers and the firm's representative. According to the growers, there is some difficulty in reaching an agreed price because the firm that is a large producer has the advantage of economies of scale compared to the small producers. Nevertheless, a pilot production programme was set up with several growers.

The pilot programme that ended in October 2006 was a combination of success and failure. While the growers tried their best to keep up with good agricultural practices related to farm hygiene, quality control and food safety, there were reports of problems in terms of water source, farm sanitation and pesticide residues, causing their produce to be rejected. Another unforeseen situation was the planting of a lettuce variety intended

for open fields in the green house. This resulted in a different outcome in terms of the desired colour.

### **Production constraints and chain management options to consider**

The development of the industry is constrained by a number of factors: the lack of marketing facilities and infrastructure, access to good quality planting materials, limited diffusion of technology, pests and diseases, and the high cost of planting materials and farm chemicals (Bernardino, 2001).

#### **Lack of marketing facilities and infrastructure**

Most of the flowers in Benguet are sold and distributed through the three main market centres at Km 5, La Trinidad; Dimalanta Section, Baguio City market; and Dimasalang Street, Metro Manila.

CARAT (2006) vividly described the flower markets in Baguio City and Benguet as:

The flower market in Km 5, La Trinidad, is located at the back of a three-storey wet and dry market. Flower vendors are housed in a shed with no walls and they make use of nets for divisions and to cover their plants. The market operates from 5.30 to 18.00. The flower market in Dimalanta section, Baguio City, is a traditional wholesale area for cut flower traders from nearby provinces and cities and local retailers. The area is in a dark crowded alley near the vegetable trading area. Buying and selling however, happens along Magsaysay Avenue, a main thoroughfare where growers park their trucks and unload their crops early in the morning from 3.30 to 6.00, just before the traffic builds up. Unsold cut flowers are brought inside the Dimalanta alley for local buyers, events organizers, caterers and tourists.

There are two cold storage facilities in La Trinidad that are used by the growers, especially during the peak season, to maximize their sales by keeping their harvest longer in the storage, in time for the big demand.

The need to establish a cut flower wholesale trading centre equipped with the necessary trading facilities in Benguet is being pushed by some individuals and farmer groups but, to date, this move has not been given priority attention. Perhaps, this need will be addressed if the growers and traders can cooperate and help government agencies concerned in dealing with the need.

#### **Access to good quality planting materials**

The growers propagate their own planting materials from mother plants. However, this practice is not sustainable as the yields deteriorate after time. The issue of intellectual property rights (IPR) is also a concern, because the majority of newly accessioned varieties are protected by IPR.

#### **Limited diffusion of technology and pests and diseases**

The growers' association can solve these constraints if the present practice of holding meetings for technology sharing among their members is strengthened. The result of

their own experiments can be shared or they can invite technologists from government offices and Benguet State University.

### **High cost of planting materials and farm chemicals**

Batt (2005) explained that by consolidating the growers' needs for chemicals, fertilizers, and good quality seed, cooperatives should be able to purchase these inputs at a significantly lower cost. Consolidating the growers' input requirements should be included in the production planning and programming meetings of the association. As reported, individual growers have been able to establish preferred relationships with farm input suppliers. This provides a good starting place to bargain for better terms and conditions for the association as a whole.

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## Coordinating a portfolio of international fresh fruit suppliers for British supermarkets<sup>19</sup>

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### Abstract

*As category managers and sole suppliers, British and Brazilian (B+B) work in a highly collaborative way with Waitrose supermarket. Quality is paramount in this relationship. British and Brazilian are responsible for the procurement of stone fruit, grapes and melons to Waitrose 365 days of the year. Product is sourced from over 20 different countries. Programmes are written detailing where and how the product will be purchased using air, sea and road transportation. Programmes depend upon product offer quality and varietal offerings, seasonality, the ability to meet packaging requirements, technical requirements including GLOBALGAP and price. These programmes are written in advance of the season and discussed with the Waitrose team and then presented to our growers so that they are aware of our requirements. British and Brazilian are responsible not only for the procurement of the desired product but also for setting prices within Waitrose. This includes achieving a twelve month target margin for Waitrose on top of the B+B margin. British and Brazilian are responsible for monitoring Waitrose's in-store wastage figures, customer complaints and product shelf life. All product arrives at the British and Brazilian pack house where it is labelled, checked and distributed to the Waitrose redistribution centres. A sample of all product is held at British and Brazilian for monitoring. A crucial part of what British and Brazilian do is to facilitate varietal development programmes globally. This includes linking growers with plant breeders to ensure our programmes deliver the best possible eating quality all year round.*

Today, I'd like to share our experiences with category management and supply chain management in the United Kingdom. Hopefully, you might learn something new or take something away from what we do. Firstly, what I would like to do is to give you an overview; a background to British and Brazilian (B+B), who we are, what we do, and the supermarket that we supply in the United Kingdom (Waitrose). I'll give you an idea of the range of products that we supply, how we procure our fresh produce, our concept of category management, and talk a little bit about supplier collaboration and how we integrate on a global platform of procurement.

B+B, British and Brazilian, started in the 1930s as a partnership between a British man and a Brazilian man. They imported oranges into Covent Garden in London. Although things have changed a lot from the 1930s, we have kept the name. We are now specialists in the procurement of grapes, stone fruit and melons globally for Waitrose. I

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<sup>19</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management



work in the stone fruit team and I will be sharing our experiences with stone fruit procurement.

The current turnover for B+B is about £30 million. Waitrose has about 180 stores. Although Waitrose is only a relatively small retailer, it's the premium one in the United Kingdom. Waitrose is quite unusual in that it is a partnership. The workers actually own the business, so it is not listed on the stock exchange or anything like that. All up, there are about 64 000 staff members at Waitrose.

Waitrose is a food-only retailer, unlike Marks & Spencer, for example, who also does clothing and other bits and pieces. Waitrose is really focused at the high end of the retail market. People who are connoisseurs of food and want the very best ingredients come to Waitrose and expect the highest quality.

Just to give you a bit of a background to our range in stone fruit, we offer our basic range in punnets. The fruit is usually seafreighted from the southern hemisphere. As this is our basic line, we try and limit the costs in that line. These are the standard varieties. The next tier – the better tier we call it – is composed of slightly better varieties from which we expect a better eating quality. For our best offer line, we procure the fruit globally. We will fly that fruit from just about anywhere in the world to guarantee the eating quality. When we are trading in Europe, for example, we are buying from Spain, France and Italy. But if we think the eating quality is actually better in the United States of America, then we will look at flying the fruit over from there. So we go to great lengths to guarantee our customers a very good eating experience.

The specifications for all these different lines are set. The best line has a slightly higher specification to get a better eating quality. For our “perfectly ripe” line, we buy this fruit and then ripen it in our packing house in England. We ripen the fruit to a very low pressure. For these peaches and nectarines, quite literally, the fruit will dribble down your face. We ripen to about two to four pounds pressure with a high Brix level. It's quite a specialized job. Some varieties will take four days to ripen; some varieties will take a day and a half. So there is a lot of knowledge that goes into guaranteeing that this fruit is perfectly ripe.

“Perfectly ripe” is a premium range of fruit that fulfils the customer's highest expectations. It combines the best available varieties to produce fully ripened fruit of the optimum quality. It guarantees the customers an eating experience that will always delight them on the first day of purchase. This is what we are looking for, and we are challenged with providing that 365 days of the year.

Stone fruit comprise peaches, nectarines, plums, apricots, etc. It is a very unusual category. It is very complicated. We have different lines of peach. Within peach, we have white-fleshed lines, yellow-fleshed lines; for nectarines, we have white-fleshed lines, yellow-fleshed lines; a great diversity can also be found in plums and apricots.

Now, with most varieties of stone fruit, they will crop for about two weeks and then we must go onto the next variety. So in total, there are probably around 400 different varieties of stone fruit that we need to come to grips with. We need to understand which

varieties are the good eating varieties and which varieties are the poor eating varieties. We will actually give global programmes to our suppliers, based on the varieties we want: “We want these varieties, but I am sorry we don’t like these”.

I will give you an overview of how we work. Our procurement is based around latitudes. If you place the equator in the middle, when we come into the southern hemisphere the first place we start with is Zimbabwe, simply because this is the first place where the fruit ripens. Then we move up here to the north of South Africa in the Transvaal. Then we move to Australia and then eventually to Chile and Argentina as they come on line. So what we are doing is actually giving programmes to our different suppliers in different parts of the world and saying, “Look, these are the different lines we want to take from you. These are the varieties. This is when we want you to start. This is when we want you to finish. These are the quantities. This is the packaging we want you to put it into”. We try and do all of our packaging at source, because it is just so expensive to do it in England.

From these countries, we move over to New Zealand. I was visiting our growers there last week, talking about programmes and varietal development and visiting a breeding programme. This is the last source of apricots in the southern hemisphere. Then we have what we call a “bridging country” up here in Mexico. This is the first country in the northern hemisphere that comes on with peaches. We take airfreight volumes out of Mexico and then we move onto Israel, Morocco, into Tunisia, and Egypt. From here we move into Europe. The first place is Seville in Spain. Then we move over into the United States of America, France, Italy and Sicily. So it is quite a cycle that we follow. This is the path that I tread each year visiting our suppliers, our growers, acting as a conduit for communication, making sure they understand what we want over in the United Kingdom, and trying to understand what is happening at source.

Category management. Why are the supermarkets not doing what we are doing? Why don’t they do it themselves? There are a number of reasons. Small companies like B+B are nimbler on their feet and more efficient than a large bureaucracy which sometimes exists within a supermarket. We do pretty much what you would expect a supermarket to do in organizing the supply of the fruit. We sit down with them and talk about prices, packaging, and all that sort of thing.

The type of category management that we do is highly sophisticated and very specialized. We deal in only three products: stone fruit, grapes and melons. We can’t supply citrus, mangosteens, mangoes, or anything like that. It’s just these three products. It’s highly integrated and collaborative.

We are charged with supplying Waitrose stores for 12 months but we also must achieve the Waitrose margin. It is our responsibility to achieve the target margin for Waitrose as well as our own company. Our form of category management is somewhat different to the form that Marks & Spencer, Tesco and Sainsbury’s have chosen in that we are the only supplier to Waitrose. If we don’t have supply, then there is nobody else there to back us up. So it’s very collaborative. There is no fighting between multiple suppliers into the supermarket; there is only us.

With climate change and more extreme weather events, we are having to come up with supply contingencies. Climate change is really impacting upon our business. I would hope that people are taking that more and more seriously now. I can walk into any of the countries that I have just mentioned and they have all got their own stories to tell. Australia at the moment has the worst drought in a thousand years. It is really causing us problems. The lack of supply from Chile last year due to extreme climate there cost us hundreds of thousands of pounds.

What do we do with this idea of category management? We have to sit down and plan. Basically, it falls into a six-month period where we do a summer category plan and a winter category plan, just outlining again which countries we will take from, why we are going to take from those countries, air freight, sea freight and which growers we are going to work with. This is all planned out in advance.

We are also charged with looking at the different modified-atmosphere technologies that are available. We look at and are responsible for looking at these technologies and where appropriate, integrating them into our supply base.

Once the strategies are there and we have talked to our buyers at Waitrose, then we write the programmes and hand these out to our growers. Everything is then organized for the coming season.

Collaboration and trust. Trust is a huge part of our business. We are very open in the way we deal and very honest. We are happy for our growers to come over and to meet us in England. We show them around the pack house, introduce them to Waitrose, show them what we do in the United Kingdom, and how their part of the programme will work and integrate into our supply base.

We try and get our growers to share best practices. We will often introduce growers from France to our Spanish growers and get them to have a chat. I will talk a little bit in a second about our first global grower conference that we held in France in Perpignan, which was hugely successful.

With stone fruit, we have developed this idea of a rot box. It sounds a bit weird, but it is basically an accelerated shelf life tool that we use. It's a critical part of our business and it really helps our growers out. With the three or four hundred varieties that we deal with, we have invested in this one guy in England who evaluates every consignment that comes to us of every new variety from every grower from everywhere in the world. It goes into this special room at 20°C and we evaluate it over five days after which time we give it an eating quality score. This enables us to identify the good growers and our not-so-good growers. We can start to adjust our programmes accordingly, or try to help the not-so-good growers achieve the standard that we want. We can also score the different varieties: "This variety is no good; these varieties are very good". We have given access to this database to our supply base globally, so they can look at how their product is performing. Within 24 hours of its arrival in the United Kingdom, information is uploaded onto the Internet. They can search the database to see what varieties we like and what varieties we don't like.

Every line of fruit that we send out to Waitrose, we keep a record of it in our warehouse and evaluate it over the week. Just as our consumers are eating the fruit and looking at how it progresses over the week, we are observing how the fruit ages. If any problems arise, we are responsible to Waitrose.

Quality is a critical part about what we do. When we talk about offer quality, we need to make sure the quality is right. For us, that is a given. The quality has to be there and we have specifications that we give to our growers and they just have to meet them as a condition of supply. They must also have GLOBALGAP and now there is SEDEX: the suppliers' ethical database exchange which helps us track and ensure minimum wages and the non-employment of child labour.

Waitrose have really embraced the LEAF programme (Linking Environment and Farming). All of our suppliers in the United Kingdom have to be LEAF-accredited and we are looking at rolling that out globally over the next couple of years. The other thing that we have embarked upon is the Waitrose Foundation in South Africa. This is a fair-trade concept where B+B pays money back to the grower over and above what we normally would. Waitrose contributes and so does the exporter. This is a means of helping develop the local people. The money goes into hospitals, into education, into buying new computers and things like that. So Waitrose really is an ethically responsible supermarket.

Food safety. It is no different for us. We have to guarantee food safety, and if ever there was a chemical scare, it's front page news. We have a Waitrose scorecard which happens every 12 months where we are scored as a technical team on how well we have done over the year. There is also a commercial side to the business where Waitrose grades us and pushes us forward to achieve new targets each year. This is a very important part of the business. We spend a lot of time with our growers trying to develop the business with them upon which we are scored every 12 months.

I mentioned the worldwide growers' conference. This is the first one of its kind that we have held at B+B. We held it in Southern France. We had our growers from all over the world: South Africa, New Zealand, Australia, Israel, Egypt, and from across Europe. It really helped to foster a spirit of collaboration. It was just incredible to have everybody there. We had Australians talking to New Zealanders and South Africans and Chileans. It was amazing. We really try to make our growers feel that they are part of a family and that we help each other out. The topics we covered included the British market, varietal development and fruit tree management. Sharing thoughts and ideas from across the world really helps our growers to adopt the best practice.

A big part of what I do, as well as travelling around the world, is visiting the stone fruit breeders. There are a few in the United States of America, France, Spain, Australia, South Africa, New Zealand which I visit to understand what they have to offer. We look at all sorts of weird and wonderful things. We have red-fleshed apricots, yellow flesh with black skin, and also another deep red one with a black skin. We are very much interested in having new things to offer our customers. For us, varietal development is very important.

Sometimes the new products work; sometimes they don't. I was in Chile a couple of years ago and tried a variety of plum called Flavour Queen. It was fantastic! It had a green external colour and was very good eating. I got onto our commercial team back in England and requested that they buy a pallet of the stuff. So just for me, they flew the pallet over and we put it into "perfectly ripe" and we dumped about 40 percent. Not unexpectedly, the management team came up to me and said, "Well done Brett; you have just lost us five grand. Good work!"

Not only are we getting involved in developing our grower base, but we also look at the shipping side as well. We conduct work on modified atmosphere packaging and storage. We then share that information with our Chilean suppliers, our South African suppliers and our Australian suppliers. Again, collaboration is there.

DELEGATE: I want your views on packaging and recycling, especially in light of some retailers in the United Kingdom introducing biodegradable or environmentally friendly packaging. At what level are you guys working to achieve that?

MR HEATHER: Recycling is an important part of our business, and if any of you have ever visited Waitrose, a condition of supply is that we supply in IFCO crates which are green plastic crates that are reusable, returnable, and are available in most parts of the world. We are also looking at, particularly on the organic side of things, new types of packaging. We have used corn starch which is biodegradable, and we are currently trialling PLA (polylactic acid) plastic which again is compostable and made from maize starch. Waitrose is always pushing us for new ideas. In some of the countries we deal in, it can get up to 50°C, so we find that some of these new wonderful new materials start to melt.

DELEGATE: I have a question about your "perfectly ripe" concept. How do you ensure that it doesn't become overripe too soon in the store? I can imagine that after two or three days, the stores will have to throw it away. How do you overcome that?

MR HEATHER: Excellent question. Retailing in the United Kingdom is very sophisticated, so what we have are chilled cabinets within Waitrose, because the pressures we are ripening to, 2–4 pounds pressure (it is about a kilogram) is very, very low. So all the product is date coded. We allow ourselves two days – it is three days from us, so two days in Waitrose. The product is chilled: the cabinets operate at 8°C with a pulp temperature of 10°C.

We need to ensure that we ripen it to the right stage. It is very easy to overripen the fruit which can be an absolute disaster. So the knowledge that we have accumulated as a company is hugely valuable. Everything is chilled throughout our chain. So once it is ripened, it is brought down to 2°C. It goes through the pack house and is chilled again. It goes onto the lorries for delivery and chilled again at Waitrose.

Our supply chains are extremely quick. For example, apricots: they landed on Saturday, air freight from South Africa, so it would probably have been two days from when they were picked. They went out to Waitrose on the same day.

Every day, we have two waves of orders: a morning delivery and an afternoon delivery to top up our supermarket shelves.

DELEGATE: With your system of grower evaluation and the rot box, have you noticed any difference in the quality of the produce delivered from small growers versus larger growers? What would be the average size of the grower with whom you deal?

MR HEATHER: We know all of our suppliers. We visit all of our suppliers and we put these pictures up to celebrate the fact that we are working with growers that we know. To answer your question, we work with a whole spectrum of growers from very small growers in South Africa and New Zealand to some very large growers. We actually work with one of the largest cooperatives in France that pack something like 16 000 tonnes a year, but we know the growers within that cooperative. In terms of the eating quality, I don't think you can generalize. I think that some of the very small growers are fantastic, but a grower in Mexico who does our organic peaches is huge. They have some of the most fantastic peaches you eat all year around. The only comment I would make in terms of eating quality is that variety is hugely important. The new advances that they are making with the breeding programmes are just incredible: very good colour, very good eating quality. This is one of the most important things for us.

DELEGATE: Can you give some examples of how you are responding to climate change?

MR HEATHER: Climate change is a huge issue. We talked about air miles, a very big issue. I have a similar experience. My girlfriend often looks at the fruit that is airfreighted from Chile or Australia and says to herself, "Should we be indulging in that?" Modified atmosphere packaging and controlled atmosphere storage has enabled us to develop more seafreight lines, minimizing the amount of carbon that we are putting into the atmosphere, but unfortunately, the eating quality is still not as good as what it is coming off the aeroplanes. It is a very difficult subject at the moment, because there are few alternatives to airfreight at the moment.

There have been discussions about some of the new airships, the Zeppelins, from 40 or 50 years ago, which are very low-carbon technology. They were saying that for a jumbo jet to move from the docking onto the runway – one of these airships can run for a week on that same amount of energy. Certainly there is nothing there at the moment that we can use other than aeroplanes. In the future, I think more and more businesses will wake up to the fact that climate change is costing them hundreds of thousands of pounds and will start to do something. I think the world is slowly moving in the right direction, but I can't really offer anything. We don't have a silver bullet at the moment.

## **The case of NorminVeggies of Northern Mindanao, Philippines**

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### **Abstract**

*This case discusses the strategies of a group of farmers called NorminVeggies who were able to market their products successfully using a business model not previously used in the Philippines vegetable industry. Their innovative organizational structure and marketing clusters have enabled the farmers to respond to a market that is constantly changing. With a corporation called Normincorp, NorminVeggies had the agility that they needed and yet, as an association, they were able to access development assistance. The association formed marketing clusters, based on farmers' capabilities, interest and capitalization. The corporation is paid a facilitation fee for the marketing services it provides which ensures its sustainability. Farmers follow a strict quality assurance plan for each product. Training is delivered on Good Agricultural Practices and designated lead farmers act as quality managers and coaches. Small farmers are clustered with independent farmers who help "jumpstart" production. Quality benefits are shared with all cluster members. Products are traceable to the farm that supplied each crate of produce. Farmers therefore maintain ownership of their product right up to the institutional market and therefore have a greater participation in the chain.*

### **Introduction**

This case study looks at the Northern Mindanao Vegetable Producers' Association Inc. (NorminVeggies), an association of vegetable farmers and stakeholders in the Philippines, who have successfully organized their own marketing group, the Northern Mindanao Vegetable Corporation (Normincorp). NorminVeggies and Normincorp have collectively improved the farmers' ability to access dynamic markets in the Philippines, particularly the fast food restaurants, supermarkets and vegetable processors.

The vegetable farmers have worked together to build their membership base, assisted each other in the production of quality vegetables, gained markets through marketing clusters, articulated their needs and interests, and accessed support from development agencies and non-governmental organizations (NGOs). By looking at the factors that help explain their success in these markets, insights and lessons can be gained in linking small farmers to markets.

For this case, data on NorminVeggies and its marketing group, Normincorp, were gathered using key informant interviews with NorminVeggies, Normincorp and stakeholders in the Philippine vegetable industry.

### The organization

NorminVeggies was organized by small farmers and independent growers to address the common concerns of stakeholders in the vegetable industry in Northern Mindanao. It is a non-stock, non-profit organization, servicing its 85 members (Table 1).

**Table 1: Members of NorminVeggies as of July 2006.**

<b>Farmers</b>	<b>72</b>
Of which: Individual producers	52
Development foundations	2
Corporate farms	7
Farmers' associations	4
Farmer's cooperatives	7
<b>Associate</b> (Inputs/Service Providers)	<b>9</b>
<b>Honorary</b> (Institutional Partners)	<b>4</b>
<b>Total</b>	<b>85</b>

Source: NorminVeggies records

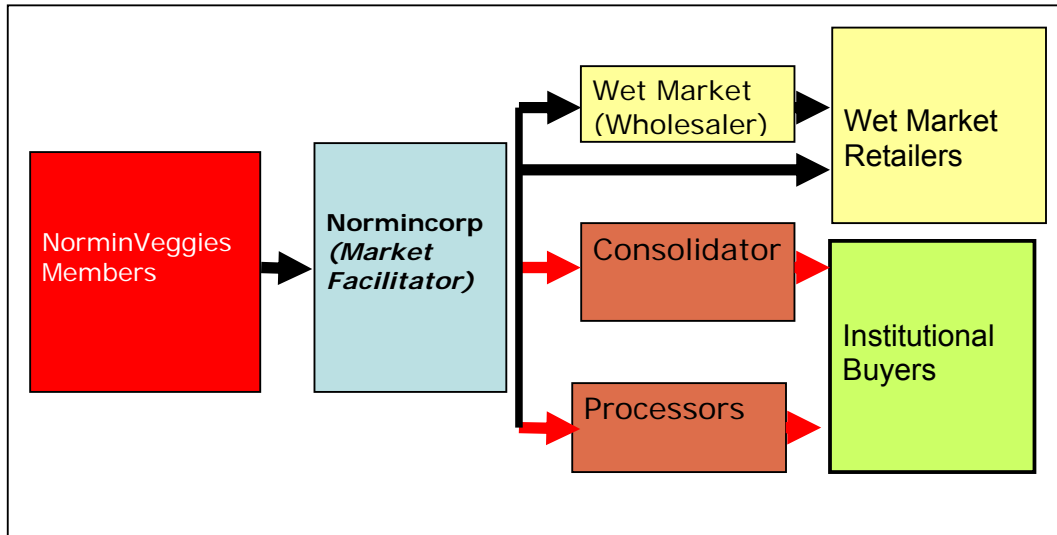
Independent growers are small farmers who are financially stronger and can independently pursue markets and adopt appropriate technology. Small farmers are those needing special interventions to undertake vegetable production and marketing. Generally, the smaller farmers are poorer and less well educated than the independent growers. Development foundations have assisted the small farmers.

Members classified as corporate farms have the ability to integrate their business operations vertically. Input and service providers include seed companies and other service organizations; local government unit members are those departments servicing vegetable farmers directly.

NorminVeggies, through the independent growers, is aware of the dualism in the vegetable supply chain in the Philippines described in the paper by Concepcion and Digal in these Proceedings. They see the difference between the needs of the traditional markets and those of the modern chains. They want to tap into both markets, delivering high quality produce to the modern chains, which may give a better price while also supplying the rest to the traditional market (Figure 1).

NorminVeggies has conducted several activities towards establishing a presence in the Metro Manila and Visayan markets. They have undertaken trial shipments using reefer vans, conducted trial plantings and identified key crops where Northern Mindanao will be most competitive in the market, and prioritized the development of these crops. They then conducted trainings on production technologies, post-harvest handling and marketing for their members. Successful production protocols were freely shared with the members. They have printed and distributed booklets on production technologies for selected vegetables.



**Figure 1: Supply chain map of NorminVeggies**

To achieve the required volume that will satisfy their target institutional markets, NorminVeggies farmers developed clusters among themselves. A cluster is an informal group of five to ten small-scale farmers and independent growers who commit to undertake a common marketing plan for a particular product (or set of products) for an identified market. NorminVeggies began with a lettuce cluster and when that proved successful in penetrating the market, continued to develop a broccoli, strawberry, carrot, sweet pea, bell pepper and tomato cluster.

Normincorp is the marketing group, incorporated by five core independent growers and the lead farmers for various crops. It services the marketing needs of ten independent growers and a core of 50 small farmers growing mainly cabbage, carrots and bell pepper and tropical vegetables like bitter melon and eggplant. This core of 50 small farmers is being assisted by the Kaanib Foundation Inc. (a NorminVeggies member) in partnership with its development resource organization, Lutheran World Relief Services (LWR) and Catholic Relief Services (CRS). In 2006, Normincorp provided marketing support for a CRS-assisted project and its partner, the Kasilak Foundation, involving farmers growing squash, chayote and bell pepper in the Campostela Valley in Southern Mindanao.

### **Participation in chain management**

NorminVeggies in partnership with Normincorp has successfully addressed the various obstacles in tapping dynamic institutional markets, each time adjusting to the trends and demands of the vegetable industry. They have become preferred suppliers due to their ability to respond to changes in market requirements and have recently ventured into forward integration by setting up their own wholesale and retail outlet at the Agora Wholesale Market in Cagayan de Oro.

Using the framework proposed by Berdegué *et al.* (2006), this section discusses the evolution of NorminVeggies from their beginnings as farmers selling in the spot market until the time they began to integrate marketing.

### **Traditional (spot) market**

Before the concept of marketing clusters, individual farmers sold their produce to the wet market in Agora Wholesale Market in Cagayan de Oro. Farmers harvested their produce without a ready buyer and were compelled to receive the price given on the day by the traders. Often their produce was sold the following day at heavily reduced prices. They were subject to market distortions, as buyers often waited until the next day to take advantage of the lower price, ignoring the depreciation in quality.

### **Specialized wholesalers**

The first marketing cluster was the lettuce cluster formed in 2001 in response to the needs of a specialized wholesaler serving the fast food industry. Blue Dairy Corporation (BDC) was the main driver for the lettuce cluster chain. The farmers were asked to use a refrigeration system when shipping the goods in order to preserve the quality and to compete with imported lettuce from Australia.

The three-tonne weekly supply from the NorminVeggies lettuce cluster met 40 percent of the requirement of BDC: the other 60 percent was sourced from the farmers in Benguet Province. The cluster grew to eight farmers, and the weekly supply of refrigerated lettuce to BDC continued for the next two years. In 2004, NorminVeggies through Normincorp supplied another fast food company, KFC. They supplied KFC directly for the first six months, then through KFC's processor in the succeeding months.

During this time, the lettuce requirement shifted from the iceberg type grown in the open field to the romaine and leafy lettuces that needed greenhouses or rain shelters for production. Rain shelters provided a greater harvest recovery rate at lower cost and as less agrochemicals were employed, a safer higher quality product. However, the fast food market in Manila ordered only during July to December and treated NorminVeggies as an off-season supplier to the supply from Benguet.

### **Preferred suppliers**

Having built a track record for quality and reliable delivery, other buyers in Manila contacted NorminVeggies through Normincorp, as early as 2003, not only for lettuce, but for other vegetables as well. This was the beginning of their expansion. New growers joined NorminVeggies and the marketing clusters for broccoli and strawberry were formed.

NorminVeggies farmers produced excellent quality lettuce, broccoli and strawberry, which were very difficult to procure in Manila. The marketing strategy was to build a name for quality in the institutional markets, to change the image of small farmers as unreliable suppliers through the clustering strategy, and to assure markets that typhoon-free Mindanao was in a unique position to address their needs during the typhoon season in Luzon from July to November. This strategy worked as NorminVeggies

products developed a brand image in the market, and were identified as coming from “Normin” (Northern Mindanao) in contrast to those from Benguet.

With lettuce, broccoli and strawberry, Normincorp was able to service other types of buyers in July 2004. These buyers included distributors who serviced the supermarkets, hotels and restaurants. When necessary, commercial cold storage space was rented to hold at least one tonne of lettuce to meet any unforeseen demand. Broccoli and strawberry were packed in ice in styrofoam boxes (the way Australian produce is packed coming into the country) and air freighted to Manila three times weekly at a consolidated volume of one tonne.

When the Department of Agriculture helped NorminVeggies gain access to a refrigerated van in Metromart, Metro Manila, as a storage facility, NorminVeggies ventured to supply the high-end restaurants in Ortigas and Makati directly; these are the two major business centres in the Metro Manila area. They rented a refrigerated truck for this purpose.

These new markets taught Normincorp the dynamics of seasonal production. While the fast food market arrangement was all year round, they found that the Manila-based supermarkets, hotels and restaurants could only be serviced economically during the typhoon months of July to November, when the freight costs to move these products from Bukidnon to Manila could be adequately covered. As a result, they chose to supply Manila only for these months. Although Normincorp could supply for only half of the year, volumes doubled and other vegetables were included, like cooking tomato, sweet pea and squash.

By March 2005, the supply to KFC’s processor stopped because the demand changed significantly. Unless Normincorp was to undertake their own vegetable processing, they would not have the market strength necessary to deal directly with the end user. At this time, the corporate farms in Luzon supplying the fast food markets had forward-integrated their production with processing to take advantage of the emerging trend to serve salad greens.

By the middle of 2005, Normincorp thus had to stop supplying the fast food market in Manila, which meant stopping all shipments to Manila as the volume became insufficient to cover the shipping costs.

Meanwhile, several lettuce farmers in NorminVeggies had invested in indigenous greenhouses and started to grow the romaine type of lettuce. NorminVeggies became a beneficiary of support from the Food and Agriculture Organization (FAO) for technology development through a demonstration project to establish three indigenous rain shelters. By the last quarter of 2005, Normincorp had the potential to re-enter the metro Manila market and other dynamic institutional markets.

### **Forward integration**

Normincorp then decided to build up its market in the Visayas (Iloilo, Bohol and Cebu), which they can supply all year round. As part of the response to the challenge of bulk consolidation, NorminVeggies have entered into partnership with DA and GEM-

USAID to establish a NorminVeggies Consolidation Center (NVCC) in the Agora Wholesale Market in early 2006. NVCC started operation in May 2006, with NorminVeggies providing the warehousing services and Normincorp the marketing services.

The Agora Wholesale Market is near the port of Cagayan de Oro and the integrated bus terminal. It is the largest consolidation area and wholesale marketplace for vegetable products in Northern Mindanao, with close to 100 stalls. The daily volume handled is an average of 150 tonnes. It is the main supply source for other areas in Mindanao (Zamboanga, Lanao, Surigao, Agusan), the neighbouring islands in the Visayas and Luzon (during the typhoon season).

However, transactions at the Agora Wholesale Market are spot relationships, and the farmers have no say on the vegetable handling and storage conditions. While NorminVeggies producers have very good quality at the farm and after harvest, poor handling at Agora has adverse effects on quality. Farmers became price takers with no access to the buyers because the traders restrict the flow of information. Post-harvest losses and wastage is high.

NorminVeggies decided to institute change in post-harvest handling, transport, packaging and storage at the Agora Wholesale Market. NVCC provided whatever services the buyers wanted, such as packaging, volume and quality specifications. They gave the farmer members services in the form of storage, order taking, sorting, washing, packing, shipping facilitation, billing and collection from buyers and remitted payment to the growers. Growers pay fees to use these services.

Through the NVCC, NorminVeggies was able to establish a track record as a supplier to Cebu, Bohol and Iloilo supermarkets and fast food sector distributors, as well as the buyers in other Mindanao provinces. The growers have maintained consistency of supply and quality. Each cluster has a target volume to deliver every week and the farmers bring their produce to the Cagayan de Oro pier through NVCC where the produce is consolidated and shipped.

The buyers in the Visayas determine the proportion of acceptable goods upon receipt at their end and pay the corresponding amount to Normincorp. Normincorp gets a percentage facilitation fee from the face value of the sale, and the balance is remitted to the grower. After a month of operation, Normincorp used its bargaining power to negotiate better payment arrangements. Some buyers agreed to send their consolidators to NVCC who pay cash as soon as the vegetables are withdrawn instead of waiting until the produce is received in the Visayas. This eliminated the losses due to trimmings in transit and the waiting time for payment.

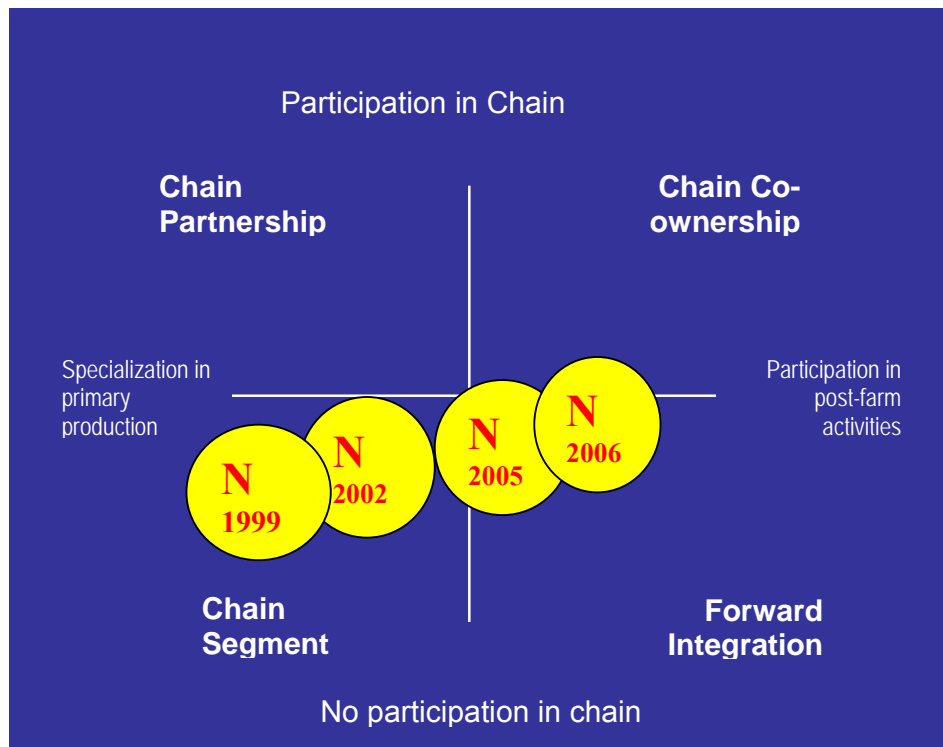
Shipments to the Visayas and the neighbouring Mindanao provinces are done every week. The buyers in these markets pay for the shipping costs and transact in cash. Normincorp with its reputation for quality and reliability has become their preferred supplier. The advantages offered by Normincorp make it convenient for the buyers to move fast in a very narrow window of time and to cut transport time.

Non-cluster member farmers, whether members of NorminVeggies or not, bring their produce without any prearrangements. Normincorp also services them. Their produce will be supplied to those buyers who want to purchase from the spot market. At the consolidation centre, farmers are able to get exposure to market buyers and Normincorp is able to get them acquainted with the quality desired by the market. These farmers gradually realize that they can get better prices if they have better quality and are part of a cluster. Since the Agora NorminVeggies consolidation stall was opened, more farmers have joined the marketing clusters. In terms of market opportunities, ten more traders have nominated NorminVeggies as their preferred supplier.

Based on the financial reports of NVCC, the difference in the costs and benefits between cluster members and non-cluster members is significant because the latter do not have access to a better market. For example: sweet pea in the Impasugong market in Bukidnon, where the small farmers in the cluster are located, are selling at Ps80/kg while Normincorp sells the same items at Ps120/kg. Even after the packaging, transport, storage and marketing fees are deducted, the net price is still higher by at least 10 percent than the Impasugong price. Table 2 shows the financial report for NVCC for the first three months of operation.

The evolution of NorminVeggies’ supply chain and its participation in chain management is mapped in Figure 2 (based on Berdegué *et al.*, 2006).

**Figure 2: Participation of NorminVeggies in chain management**



**Table 2: NorminVeggies consolidation centre income statement in Pesos  
(US\$1 = Ps53), May to July 2006<sup>20</sup>**

<b>Item</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>August</b>	<b>Total</b>
<b>Income</b>					
Storage fee	25 786	30 248	36 418	53 447	145 899
Packaging	316	981	1 577	2 345	5 219
Marketing premium	2 559	2 988	3 618	4 880	14 045
<b>Total Income</b>	<b>28 661</b>	<b>34 217</b>	<b>41 613</b>	<b>60 672</b>	<b>165 163</b>
<b>Expenses</b>					
Salaries	12 075	11 075	11 250	11 050	45 450
Benefit contributions	569	569	569	569	2 276
Daily wages (labour)	1 800	3 050	3 780	3 750	12 380
Rent	10 000	10 000	10 000	10 000	40 000
Transport	378	122	36	91	627
Light and water	1 633	1 033	1 333	1 432	5 431
Office supplies	2 392	59	134	318	2 903
Miscellaneous	127	63	366	458	1 014
Pre-Operating Expense	2 266	2 266	2 266	2 266	9 064
<b>Total Expenses</b>	<b>31 239</b>	<b>28 237</b>	<b>29 734</b>	<b>29 934</b>	<b>119 144</b>
<b>Net Income</b>	<b>-2 578</b>	<b>5 980</b>	<b>11 879</b>	<b>30 738</b>	<b>46 019</b>

<sup>20</sup> Based on agreement, NorminVeggies is 20 percent owner of Normincorp. The marketing premium is Normincorp's contribution to NorminVeggies. To simplify computations, 10 percent of Normincorp's facilitation fee at the NVCC is NorminVeggies' share and recorded as marketing premium. The item for salaries is for the consolidation in-charge and a night guard. Daily wages are the hired labour to unload vegetables from the vehicle at the consolidation centre and for general maintenance. Rent covers the rent for the land. The building, valued at Ps475 000, was constructed by the Department of Agriculture as support for vegetable industry development through NorminVeggies. The agreement is for free use. Even if members contribute, pre-operating costs are computed and amortized for a period of five years.

### **Critical success factors**

NorminVeggies operates as an association which aims to benefit its members. One of the critical success factors of NorminVeggies is that it is able to tap a support system which gives members access to resources available only to groups and not to individual farmers like training, technical upgrading and market assistance. Benefits include the following:

- Production protocols are available to members so that they do not have to resort to trial and error. Farms are open to each other for sharing experiences;
- assistance from NGOs and development agencies like FAO, which gave them marketing training and technical demonstrations on rain shelters;
- assistance from Growth Equity in Mindanao (GEM) which provided institutional strengthening. GEM also provides 80 percent of the funds for administrative staff and support for events like the annual vegetable congress;
- assistance from the Department of Agriculture on technology- and production-related trainings, access to a cold chain, a refrigerated truck and other new technologies;
- assistance from the Kaanib Foundation for small farmers who need special attention and a voice in the policy being formulated that affects the vegetable industry.

Moreover, any market developed belongs to all the members of NorminVeggies. Members have better bargaining power in the market because of the quality, volume, variety and continuity of supply provided by the supply base. An improved supply base gave them access to more diversified and predictable markets. The members receive a higher price, they have reduced post-harvest losses, achieved higher recovery rates and higher net incomes.

Second, NorminVeggies evolved a new business model with Normincorp as the market facilitator, which is run professionally as a separate business entity. Transparency in all sales transactions facilitated through Normincorp was due to the use of a facilitation fee for the payment of services. All the proceeds from the sale of produce are returned to the farmers, less a facilitation fee to Normincorp and storage fee to NorminVeggies. The transparency in transactions has reinforced trust among the members of NorminVeggies. The relationship among the growers has become stronger.

Third, through the clustering strategy, the core value of sharing is being emphasized among all the producers including the small farmers. It is understood that when a farmer is taken into a cluster, he or she is under a strong obligation to work with the group including the protection of its reputation as a producer and a marketer. This core value is given much importance and failure to meet this expectation can result in the grower being removed from the cluster. The unity of the group is severely tested when growers are tempted to sell to other buyers in the spot market for immediate price benefits, while contracted buyers may be left with insufficient produce. Produce consolidation through the clusters is one of NorminVeggies competitive strengths.

NorminVeggies members share the core values of interdependence, responsibility, commitment and trust. Working together through the daily challenges of a dynamic market has made the members of the group realize that these core values hold them together. They also seek to provide each other with an opportunity to improve production technology, quality awareness, packaging and other competencies needed to access markets. The members who are more financially independent are acutely aware that much of the assistance they tap as an association is because of the small farmers. Therefore, small farmers are assigned products that only they can market. These are products which are labour-intensive, low-risk and have lower costs of production such as sweet peas, cabbage and carrots. The more financially-independent growers, on the other hand, provide the back-up system for the small farmers in case there is a crop failure. Independent growers altogether plant to provide a 25 percent backup in the volume required by the market from the small farmers.

NorminVeggies is a learning organization, flexible and adaptive to the changes in the industry. NorminVeggies is able to respond because the communication among the members of the Board is open and transparent. When the lettuce cluster and the other products started to pick up in volume, the Board decided that a corporation needed to be formed to run like a professional business. Decisions needed to be made swiftly. The marketing activities of the association, including market information, market development, shipping, negotiation and other market-related activities were assigned to Normincorp. Normincorp actively seeks high value markets and constantly analyses the changes in the markets; this analysis is openly communicated to NorminVeggies members.

Finally, NorminVeggies is comprised of people who have either been involved in the vegetable industry for a long time, have been business executives in other industries, are graduates of agriculture and its related fields, or have the passion for the industry and the small farmers. The individual group members are responsive to the markets and believe that any market developed belongs to all the members of NorminVeggies.

It cannot be denied that the strategies employed by the group such as marketing clusters, forming a marketing group (Normincorp), forward integration, quality and supply chain management, and developing the discipline required in business within farmers, have been realized because of the presence of people who have managerial, entrepreneurial and leadership skills, as well as a genuine desire to help very small farmers.

### **Conclusions and recommendations**

The organizational innovation of NorminVeggies has several elements: product consolidation through clustering; a new business model through Normincorp; supply chain management; networking; and linkage and development intervention for the greater inclusion of small farmers.

The clustering strategy enables small farmers to be active players in the supply chain, to meet the basic demands for volume and consistent quality, and cater for dynamic markets like the fast food chains, processors and supermarkets.



It takes time to develop a functioning cluster. It starts with a random group of farmers producing as individuals. Over time, those who can work in the cluster (particularly in sharing best practices, the commitment to quality and reliable delivery, and the willingness to pay the costs of management) will become evident. Those who cannot will leave as willingly as they came in. When growers understand and experience the benefits of cooperation, only then can there be cohesion in the cluster.

The cluster is not an ordinary grouping. Rather, it is one that has marketing goals and management systems. A business organization taking bold steps as a social enterprise is needed to realize the goals that benefit a wide base of growers. A core group of enterprising and agribusiness-oriented farmers is necessary to provide the internal strength for the organization to pull the small farmers along.

Small farmers have the productive potential because of their number and spread. However, infrastructure gaps, low productivity, attitudinal problems and other constraints mean that they need development interventions from private development resource organizations and government to address their limitations. There is also a slow maturation period required as small farmers are gradually trained, learn new values and skills, and are primed for business-like operations.

The key to successful marketing is effective management rather than the level of sophistication of the marketing system. This implies that what counts is organizational management (or how farmers can get their act together) and operational efficiency (a high level of coordination in the sequence of activities that move products cheaply from the growers to the buyers).

The ability to maintain market position is a result of how fast growers can keep up with the changes in an evolving supply chain. Competition from vertically-integrated suppliers like corporate groups can exclude small farmers from the market. There is a need to invest constantly in new technology, market research, communication and good financial management.

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## Contract farming<sup>21</sup>

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### Abstract

*Contract farming is a business development concept that brings the CP Group back to the basics of agricultural business. CP has always realized that farmers are our lifetime partners so we do business for their development. CP projects have the objective of ensuring farmers get a sustainable income and better quality of life so that the whole country may develop. When operating an agribusiness, CP begins by analysing the market potential, i.e. global and domestic market conditions, production volume, export and import conditions, pricing, knowledge capacity, production potential, human resource potential, and food safety and environmental concerns. Contract farming finds its place in this method through CP's "Complete package programme", which also includes building links between farmers and financial institutions. Farms involved in the complete package programme benefit from cost reduction, risk reduction, increasing yield and income. CP also provides any new technologies needed for the business development of its contracted farmers. On fresh produce, CP is focusing on tropical fruit and flowers. The goal of the group is to produce fruit to the higher quality standards demanded in Japan, Australia, Europe, the People's Republic of China and other Asian countries. The development of adequate technologies for managing quality during pre- and post-harvesting is one of the group's priorities. In the flower business, CP fully meets the standard on producing seedlings and young plants that are free of any diseases. CP Flower products have been launched both in domestic and overseas markets such as Japan, the Netherlands, Denmark, Germany and North America.*

### Introduction

First of all, I would like to thank FAO for inviting the CP Group to make a presentation today. CP is a big group that has many business interests worldwide. In 2003, the CP Group had a turnover exceeding US\$13 billion and we are very proud to be a Thai company. Next year we will celebrate our 85<sup>th</sup> anniversary.

Our main business is agriculture, but as agriculture is not so profitable, we have diversified into many other businesses. The group is divided into ten main businesses. Every group has a president which shares the same mission: how to develop the market, how to develop the business, and how to develop the customer.

In Thailand we have around 3 700 7-Eleven stores and around 80 stores in China. It is our retail business that provides the opportunity for CP to link the farmers to the market.

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<sup>21</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management

Fresh produce is a relatively new business for the CP Group, but we have taken a long-term view. We believe that the farmer is our lifetime partner, so we need to help them. We develop the market and link it with the technology that we have and the expertise we acquire from our partners.

We focus only on high-quality product. As the market for fresh produce is very price-competitive, the farmer is always thinking about the price. To compete, we need to find a way to help them understand the market if we are to bring to them a better profit.

If we want to secure the farmers' product, we need to show them how to produce it. While we seldom have a written contract, we always use written product specifications to make sure that we all understand the same thing. What we say, the farmer believes, so we must do what we say. If you don't, you will lose the farmer.

### **Our guiding principles**

I want to start with teamwork. When we watch football, everyone in the team – whether it's the defensive team or the offensive team – is a part of the team and when everyone works together, the team wins. When we talk about our team, the farmer is the most important person in the team.

Who is the team? We cannot do it alone. We gather together a number of other organizations that have similar objectives. The BAAC is a Thai bank, a government bank that has a problem. When the bank gives a loan to the farmer, sometimes the farmer cannot pay back the loan, because the farmer does not have a market. We cooperate with the bank. We cooperate with the Department of Agriculture. We provide the market and we provide the technology.

The project that we propose is often described as a complete package. It's in our name: CP. C is "complete" and P is the "package". In this package, farmers try to grow the best product, but we are in charge of the market. We try to get the best prices, reduce the costs and minimize the risks.

Our target is to provide a higher income for the farmer and to ensure that it is sustainable. We begin by clearly discussing with the farmer what we need to do. The main objective is for the farmer to learn how to produce the product and to aim for the best quality. However, of the produce that is grown in Thailand, only ten percent will meet the standards we require. The rest will find its way onto the local market.

Every year we have a problem with price. This is a headache for government. We let the farmers do what they are good at. We let the bank do what they are good at. Then we cooperate with the government to bring it all together.

We need to guarantee some things. If not, the farmers will not follow us. We will not say that we will secure the best price for them, but what we will provide is a guaranteed price. The guaranteed price comes from calculating the cost. The farmer must have 25 percent of the profit from the cost of production. This is the ideal, but, as you know,

seldom achievable. In agriculture, many things are uncontrollable and we need to let the farmer know that.

Our first strategy is to increase the yield. The best produce comes from the best seed, the best management, and the interaction of both with the environment. This is the main thing that we need to teach the farmer and this is why some farmers have been working with us for more than 20 years.

Our second strategy is to produce the best quality product. Quality describes not only the physical characteristics of the product but also the quantity of the product potentially available. In the first instance, most of the farms in Thailand are small scale; often less than 10 hectares. So, if we want to produce a lot of product, we need to have many farmers.

In our company we say that quality is our life and the integrity of our brand comes from quality. Sometimes the farmers make mistakes, but first and foremost we require one thing from them. They must commit. They must try to do their best.

For us to succeed, the team must have one thing in mind: we want to achieve. To achieve, it means that the farmer must have a target. The bank has a target. The government has a target. CP and I have a target. We work together and we try to bring one thing, a sense of belonging and partnership, because the project is not short-term. Every project is long-term. Some people are willing to work with us, others are not, and we need to clarify this from the outset.

At CP we also invest in our own farms. All together, we have six fruit farms in Thailand. We select the best location to produce the best quality fruit. The fruit we cultivate include pomelo, mango, mangosteen and longan. This is the produce that Thailand has a lot of. Then we set the calendar: when we will have the best product and from where will we source it. Then we develop a relationship with the market.

One thing that we are doing continuously with the government is trying to promote the best product. In the People's Republic of China, you can buy Thai produce anywhere, but the customers always complain, "Why is the durian like that? Why is the mangosteen like that?" This is mainly because of the logistics. We guarantee our product and we work continuously to improve our quality.

Food safety is another issue we need to think about. Not only must the produce be of good quality, but it must be safe for the consumers. Let me now introduce some techniques which we employ so that people can rely on us. In our warehouses and packing sheds, we operate under good agricultural practices (GAP). In addition, some of our greenhouse farmers need to adopt practices that reduce the use of chemicals. In Thailand, the government has done a really good job introducing GAP to the farmers. These are the type of farmers that are introduced to our team.

In some instances, we have developed pesticides that are not chemicals. We call these biopesticides. We have our own research and we make our own products available to our contract farmers. This way we can guarantee food safety.

In Thailand, we have a big problem with labour. The cost of labour is increasing every year, but now it has gone so high as to threaten our competitive advantage. To overcome this problem, we need to introduce some technology, but this technology is not only our own. For example, CP has good cooperation with Australia, particularly with Queensland, because the growing conditions there are very similar to those in Thailand. They can grow durian there, longan and mangosteen. Also, the Australian Government is cooperating with the Thai Government. We also have a joint venture with a Japanese company. Although they don't import much from Thailand, they are a really high-value market, especially for mango and mangosteen.

On our farms, we focus on products like pomelo that we think will be good for Thailand in the long term. However, if we are to be successful, we must clarify what we expect from the farmer. To ensure that our farmers understand what we say, we have introduced a harvesting manual that we borrowed from Australia. Once the farmer understands this, we need to give them some idea about what price they can get. Sometimes we bring the farmers to see the market together.

Longan is also another good product from Thailand, but we experience problems every day in our export markets. Thanks to some new technology, we can export: even if it goes by ocean and takes about 20 days. The quality on arrival is still acceptable in the market.

Mango is the main product that we export, because, in Thailand, we have many mangoes. Mango is also the main product that Japan imports. After ten years of research and development, we know what variety we need to grow and the techniques that we need to employ to improve the quality of fresh fruit exports. Today, we have many varieties on our farms that are grown to meet the specifications of each market. Every mango farm that wants to export must be GAP-certified, especially if the product is going to Japan where there is a list of 714 chemicals that they cannot use. This is something that we need to make sure that the farmer understands.

If we are to export, we need high-quality product, but we also need to give the farmer a high price. This brings us to our third strategy: how to reduce the costs.

We can now say that Thailand is the leader in the Japanese market for mangosteen. However, this is one of the most difficult crops to export, for although it looks nice on the outside, inside there are many problems. For some farmers, their trees are more than 100 years old. Now, in a joint venture with Diamond Star from Japan, we have new equipment that guarantees that the fruit we export will be good inside. We need to do this with every piece of fruit we export because Japanese quarantine is very strict and often, under the skin, they will find some insects.

Another problem is sweet corn. In the past, we had to import the seed, but now CP produces its own. Baby corn is a crop of only 45 days duration: the farmer gets his money really quick and this is a very good product. However, we need to train them how to grow it. In particular, we need to show them how to reduce the chemicals and to ensure that the product is handled appropriately after harvest to make sure that our customers will be happy.

The last thing is flowers. Flowers are also a new business for me, but now we have a good relationship with a Japanese customer. This is a big market. We need to develop some tropical flowers which the market needs and develop some special varieties. We will do this under contract. We use our own network to distribute both internally and also to the export market. The two crops we will concentrate on are Anthurium and Phalenopsis.

To conclude, to be successful in contract farming, you need to have a good market and good team work. We need to have a production team that can produce good-quality product which the market can accept, the ability to deal with many small farmers, and the ability to transfer technology to them. If I had a choice, I would not enter into a contract, but a contract offers a position that is win, win, win. The farmer wins, we win and the customer wins. Because we have a good team, we can produce good-quality product at a lower cost than if we were to do it ourselves.

The farmer finds it difficult to trust us, so that is why I said that even sometimes when we don't have a written contract, when we say, the farmer believes. We must be aware of that and not disappoint the farmer. But not all the farmers are good. Because there are so many small-scale farmers, it means that there are many bad farmers. We need to select the good ones. From the start, we establish a production plan and determine upfront what prices the farmer will get. We offer quality incentives to encourage the production of superior-quality produce and CP will cooperate with the bank to provide the finance the farmer so often needs.

DELEGATE: Thank you. In this presentation as in Jenny Mercer's presentation, we see that quality is the most important issue. You have shown the quality charts for mango and mangosteen, but how do you remunerate the farmer for producing superior quality? How do you guarantee that the farmer who has produced higher quality is paid for this?

MR POONPIRIYASUP: In the first instance, we try to identify the farmers who have experience. For the first three years, there are many problems, but the farmer is growing a crop that will last for at least ten years. The proposition that we bring to them is that our company is 85 years old. Over the next ten years, your orchard will produce fruit, so why don't we join together?

Because the farmer does not always understand, we need to communicate using the farmer's language. We need to make sure that the farmer believes in us. If we set a minimum price it means, for example, "this is grade B; we will sell this to the local market", but for grade A, the farmer needs to give more attention and incur more costs in taking care of the produce. We need to encourage them. Like I said, a 25 percent margin is the guaranteed price that we set as the target. The farmer must grade, but sometimes the farmer cannot do it. Our team needs to help them. After three years, the farmer will have the appropriate technology on-farm and then we can manage them easier. Sometimes I am fighting with the Accounting Department, because Accounts just wants to see the profits, but I must take care of my investments.

DELEGATE: You said that you do not always make the written contract with the farmers and furthermore not all the farmers are good. So, how do you manage the farmers, the production and the quality without the written contract?

MR POONPIRIYASUP: As I said, we collaborate with at least four organizations. With this information, we know who the more advanced farmers are. When we form farmers' groups, only the good farmers will be approved. If a farmer is not selected, more often than not, this is not a problem. Even for farmers in a group already, we need to check them out; to identify what they know and what they don't know.

Training is the most important thing. Because we provide the training and we have the technology, the farmers need to buy the seed, the fertilizer and the chemicals. To train our farmers, we cooperate with the government. The government also understands what we are doing it for.

DELEGATE: Are you concerned about sustainability?

MR POONPIRIYASUP: Yes, sustainability is very important. Because we want to extend our market, our total offer's quality is very important. Every farmer needs benefits. We bring something to facilitate development in the community. When we cooperate with a farmer, the farmer wants to sell us more and more and other products, so we must have the market. When the market price fluctuates, we will face difficulties, but through the contract, we guarantee that the price will not be lower than the minimum guaranteed price.

## **Contract farming and cut flowers: an Ecuadorian export cut flower firm's response to dollarization**

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### **Abstract**

*The international development community has made a significant strategic policy shift towards the use of high value-added market-driven development initiatives, with contract farming as a mechanism to assist small impoverished farmers to link themselves with international markets. Although contract farming has been in existence for many years as a means of organizing commercial agricultural production of both large-scale and small-scale farmers, its use is still highly debated in the development literature. Recent empirical evidence suggests that contract farming can produce substantial positive direct and indirect economic benefits and horizontal and vertical spillovers when a stable macroeconomic and legal environment is established and coupled with positive foreign direct investment (FDI). Researchers, however, have been unable to determine the relative importance of FDI versus a stable international market linkage as the catalyst for these contractual innovations. During the 1990s, the Ecuadorian export cut flower industry expanded rapidly by exploiting a unique financial arbitrage opportunity provided by the combination of an American dollar-denominated export market, a rapidly depreciating local currency and an inelastic labour market. Exporters profitably exploited the increasing exchange rate between the American dollar and the Sucre. Recognizing that the Sucre was depreciating at a rate of approximately 50 percent per annum, by the end of the 1990s, labour costs quickly became insignificant and most of the industry was highly inefficient. However, the unanticipated dollarization in January 2000 removed this arbitrage and confronted producers with not only American dollar-denominated product markets, but also American dollar-denominated factor markets. Firms were forced to change their production practices and business models in light of the dramatic change in input prices, or exit. The result was a substantial organizational and institutional innovation as firms attempted to identify and develop more efficient business models that provided sustainable competitive advantage within a high labour-cost environment. One of the critical innovations related to the establishment and diffusion of a cut-flower production contract between a medium-sized cut flower producer-exporter and the surrounding small-scale vegetable farmers. This paper evaluates the factors that contributed to the introduction, diffusion and impact of this contract production model.*

### **Introduction**

During the 1990s, the Ecuadorian export cut flower industry expanded rapidly by exploiting a unique financial arbitrage opportunity created by the increasing exchange rate spread between the American dollar-denominated export market and rapidly depreciating Sucre-denominated input market. Hyperinflation was causing the Sucre to depreciate at more than 50 percent per annum by the late 1990s. As a result, Sucre-



denominated input costs quickly became insignificant, especially labour costs. The result was a highly inefficient, low-skilled, low wage, high labour use industry, as there were few incentives for firms to operate differently. However, the unanticipated dollarization of the Ecuadorian economy in January 2000 removed the arbitrage and dramatically changed the incentive structure. Producers were now confronted with not only American dollar-denominated product markets but also American dollar-denominated factor markets. Whereas labour inefficiencies were previously of no concern, suddenly they became an extremely costly constraint. This forced inefficient firms to exit while those who remained had little choice but to change their production and business practices in light of the dramatic change in factor prices. The result was a period of substantial innovation as firms attempted to identify, develop and implement more efficient business models that provided sustainable international competitive advantage within a high labour-cost environment.

One of the critical innovations was the establishment and diffusion of contract cut flower production. Using an instrumental case study of contract production within the Ecuadorian export cut flower industry, we empirically evaluate the critical factors that contributed to the adoption, diffusion and impact of a contract production model implemented by a medium-sized cut flower grower–exporter with small vegetable farmers in Ecuador. The specific contractual innovation analysed relates to a particular cut flower species that is highly demanded in the American market, but dollarization induced labour and chemical cost increases made the traditional high labour–low wage business model unprofitable. Hence a new business model was required. Drawing upon numerous unstructured and semi-structured interviews and participant observation conducted over the summers of 2004 and 2005, the paper analyses and evaluates the structure of the contractual innovation and the impact of the diffusion. We ascertain that the effects of the increased real labour costs and effective market stabilization brought about by dollarization caused various levels of innovation: the provision of technology, agronomic and management support, seeds, transplants and credit. These innovations have had a substantial positive benefit on small local producers who were otherwise excluded from international markets or faced substantial barriers in participating in them. We also discuss a number of the important vertical and horizontal spillovers observed.

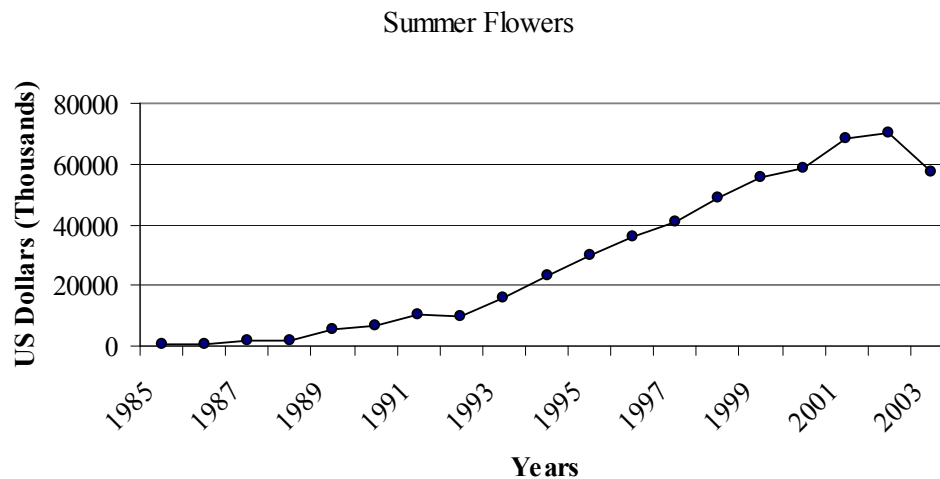
### **The Ecuadorian export cut flower industry**

The Ecuadorian export cut flower industry is Ecuador's third largest export industry. It is primarily centred outside the capital Quito, but additional production is now found in Cotopaxi, Ambato and Cuenca. There are two subsectors: roses and summer flowers. Roses are the larger subsector and are generally cultivated at higher elevations in greenhouses, whereas summer flowers are generally grown at lower elevations in open fields. The majority of flower exports are destined for the North American market, as the European market is dominated by cheaper African production.

A convergence of factors drove the rapid growth of the Ecuadorian export cut flower industry during the 1980s and 1990s. These factors included: Ecuador's ideal climate; an abundance of cheap labour; relative proximity to export markets; favourable exchange rates; and low tariff rates (Blumthall and Gow, 2005). During the 1980s,

growth was fuelled by high Russian flower prices and Ecuador's proximity to the American market. The passage of the Andean Trade Preference Act provided further impetus with duty free access to the American market. Finally, the Ecuadorian export cut flower industry boomed during the late 1990s as exporters exploited a unique financial arbitrage opportunity provided by the combination of an American dollar-denominated export market, a rapidly depreciating Sucre and an inelastic domestic labour market (Figure 1).

**Figure 1: Growth of Ecuadorian export summer flowers based on American Dollar value free on board (FOB)**



Source: Expflores unpublished data

This unique combination of financial market factors provided exporters with the opportunity to delay, without cost, the collection of accounts receivable in the international flower market by extending terms of credit by up to 90 days or more to American buyers, while concurrently paying employees at fixed wage rates above the annual government-determined Sucre-denominated minimum wage rates. Labour is the largest factor cost of production and usually accounts for 50 percent or more of the total costs of production under stable input and output price conditions. However, with near hyperinflationary conditions in the late 1990s, cost inefficiencies that resulted from the slightly higher wages quickly became insignificant to producers: the government minimum wage rate was only adjusted one time per year, in January, and then by a factor far less than the prevailing inflation rate. Consequently, exporters profitably exploited the increasing exchange rate spread between American dollar-denominated sales and rapidly depreciating Sucre-denominated factor costs (Blumthall and Gow, 2005).

In January 2000 the Ecuadorian government unexpectedly dollarized the country's economy to avert the ensuing financial and political crisis. This immediately threw the export cut flower industry into turmoil as it dramatically changed the industry's underlying cost structure (Blumthall and Gow, 2005). Many firms were forced into bankruptcy. Only those firms who recognized that labour factor costs were now fixed

rather than depreciating and were willing and able to respond survived. To do so, these firms were forced to change their production and business practices dramatically. The result was a period of substantial organizational and institutional innovation as firms attempted to identify and develop more appropriate business models within this new high labour cost environment.

### **Overview of Ecuadorian cut flower producer–exporter**

The firm of interest is a summer flower producer and exporter located on 26 hectares in a valley near Ambato, in the Tungaragua province.<sup>22</sup> Ambato is a commercial centre of about 250 000 residents that supports the nearby rural areas that have traditionally produced a range of fruits and vegetables for domestic consumption. The farm has been operating since 1996 and employs 126 people. The farm produces 19 varieties of summer flowers primarily for the American export market, of which *Solidago* (golden rod), *Consolida* (larkspur) and *Delphinium* (Delphinium) are their main crops.

#### **Target market**

Approximately 80 percent of production is sold in the American market to importers and wholesalers who primarily supply supermarkets. The remainder is sold in Canada and Europe. The firm's business model specifically targeted the American mass market for cut summer flowers. This is a highly price-sensitive commodity market with extremely narrow per-unit margins. Thus profits are derived from being a large volume cost-effective producer that consistently meets the American mass market specifications in a timely manner at competitive prices. Recognizing this, the firm continuously evaluates opportunities to increase productivity and reduce costs. The owner has identified five components that directly affect his profitability in the American mass summer flower market: suitable marketing channels; labour costs; pest and disease control; access to inputs; and production of appropriate crops.

#### **Marketing channels**

Traditionally, the firm sold its product through an Ecuadorian export flower broker as direct marketing to American customers was too difficult. Since dollarization, the firm has begun establishing exclusive marketing relationships with various key account customers in an attempt to gain higher farmgate prices. By eliminating the broker and selling flowers directly to clients, the firm has reduced market uncertainty, gained greater knowledge of its market, client and customer product requirements, and established appropriate ownership and feedback loops, thereby allowing it to provide better service and capture increased margins. To do this, it recently developed a website. This new interface has also increased its ownership of the final market interface and provided it with greater control over the market relationship and customer interface.

#### **Labour costs**

Cut flower production is extremely labour intensive. Labour usually accounts for about 50 percent of the total costs of production. In Ecuador, planting, harvesting and chemical applications all require manual labour. Traditionally, 11 to 12 people are

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<sup>22</sup> We are unable to provide the name of the export firm due to commercial reasons.

employed per hectare on an average farm size around 15 to 20 hectares. Therefore, the labour and associated monitoring costs can be high.

### **Pests and diseases**

Cut flower production requires diligent management of pest and disease problems. For the firm's larkspur crop, the biggest problem is soil-borne diseases which develop as a result of monoculture production. To combat these disease problems, the standard method of control has been field fumigation with methyl bromide in between every crop. This means the soil is sterilized every 22 weeks. The only other method to combat this disease buildup is crop rotation. However, for this particular farm, a rotation system is not viable because of the scheduling complexity required to produce multiple export flower varieties simultaneously.

### **Ownership of inputs**

The farm currently produces 60 percent of its input plant materials using seeds and vegetative cuttings. They began this practice after a supplier failed to meet their input demands for Mother's Day sales in the United States of America, the second largest holiday for cut flower sales. The firm decided that they could no longer rely on an outside supplier, so they established their own propagation facilities to control the quality and delivery of planting materials. This innovation increased plant quality control, reduced losses and decreased pest and disease problems, thereby decreasing labour and production costs, reducing supply chain risk and increasing management control.

### **Larkspur - the crop of interest**

The American cut flower market demands a consistent year-round supply of quality larkspur (Gill *et al.*, 1997). However, the production of larkspur presents various production complications due to its susceptibility to soil-borne diseases. The traditional field production control methods used to control this require intensive and frequent application of methyl bromide for soil sterilization (Gill *et al.*, 1997). This is not only costly and dangerous, but there is the threat of increased environmental regulation due to its potentially harmful environmental effects. Consequently, commercial larkspur production is becoming more complex and costly.

## **Dollarization as a driver of business model innovation**

Dollarization fundamentally changed the underlying cost structure for export cut flower production by simultaneously removing the exchange rate arbitrage opportunity and fixing labour costs. This forced the firm to review and restructure its fundamental business models and practices for all cut flower production including larkspur. To remain internationally competitive in their target market, the firm needed to make labour cost efficiency their number one priority. To achieve this, they needed to decrease the labour force per hectare, increase productivity per person and increase planting densities.

Strategically, three factors would allow them to increase planting densities without adversely affecting their ability to meet the American quality standards; (1) their target market had relatively lower quality requirements than other market segments; (2) they

had complete ownership and control of input and seed stock quality through their nursery; and (3) their highly qualified staff could actively control and monitor production management practices.

On evaluating larkspur production, it was obvious that their current production model was unprofitable under the new market realities. The post-dollarization labour costs associated with frequent methyl bromide application had become too high. They also realized that crop rotation was not a commercially viable management alternative due to conflicting flower production requirements. Thus, an alternative production model was required if they wanted to remain a cost-effective larkspur supplier to the American mass market.

An observant technician identified that local vegetable growers produced very high quality vegetable products (mainly broccoli, cauliflower, tomatoes, and potatoes) using various rotational production methods for the domestic market. After some serious reflection, the flower farm realized it could develop a rotational contract farming model that leveraged its technical and marketing skills against the technical production properties of larkspur and the local farm management practices of the surrounding small-scale vegetable growers.

Larkspur has a relatively short cropping cycle of 18 to 22 weeks, depending on temperature, and requires low tacit knowledge and technology for production, but high tacit knowledge for event control such as pesticide timing and harvesting. Additionally, the short cropping cycle provided these farmers with the opportunity to adjust production to match the flower farm's sales forecasts rapidly. The flower farm's highly trained technicians possessed the appropriate technical skills to manage an outsourced contract production system effectively.

#### **The contract production model with small scale vegetable growers**

Over a four-month period, the flower farm initiated an informal contract production model with twenty small vegetable growers (< 800 m<sup>2</sup>) producing a total of five hectares of larkspur. The contract was seasonal with farmers rotating larkspur production into their standard vegetable crop rotation. The only restriction was that larkspur could not be planted on the same plot of land until at least five other crops had been cultivated. This prevents soil-borne diseases. It also allows larkspur production to fit seamlessly within current low-technology rotational vegetable production methods. This reduces farmers' adoption and switching costs.

The flower farm provides each contract farmer with the required plant inputs on credit which are discounted from the final product payments. However, the farmers are responsible for purchasing any fertilizer and pesticides. This is because the farm has no way to enforce the use of fertilizers or chemicals.<sup>23</sup> Contract farmers must meet a strict set of quality standards in order to meet export standards. The flower farm's technician assists farmers in adopting the best practices. The technician visits each contract farmer twice a week to monitor plant growth, management practices and inspect for insects and disease, as well as making management recommendations on fertilizer and pesticide

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<sup>23</sup> See Gow *et al.* (2000) and Gow and Swinnen (2001) for an extensive discussion of these enforcement issues.

application and harvest. The contract farmers are responsible for transporting their larkspur to the flower farm.

Farmers have the option of delivering the larkspur with or without the foliage removed from the stem. The pricing structure is set up to encourage farmers to remove foliage, as that reduces post-harvest labour requirements for the exporting firm (Table 1).

**Table 1: Prices paid to vegetable growers per larkspur stem (US\$)**

<b>Stem length</b>	<b>Foliage removed</b>	<b>Prices</b>
70–100 cm	<b>yes</b>	0.105
70–100 cm	<b>no</b>	0.09
60 cm	<b>yes</b>	0.05
60 cm	<b>no</b>	0

To provide farmers with appropriate production management and quality control incentives, the farm has instituted a transparent quality assurance system that links the end users' quality assessment of each bunch of flowers directly to the payment that farmers receive. Each farmer is assigned an individual number that allows the larkspur to be tracked from the field to the American customer. The contract farmers receive their payments 30 days after the larkspur is exported with a deduction being charged against the contract payment for any damaged or inferior flowers received in the market. This payment structure allows for direct feedback from American customers and provides the opportunity for the exporter, technician and contract farmer to collaborate in identifying causes and developing solutions to the problem.

Once the larkspur is delivered to the exporting flower farm, they perform the post harvest tasks of grading the stems for length, bunching and packaging for shipment. Flowers are exported daily from the Quito airport. The post-harvest costs and technician salary add US\$0.06 per stem to the total cost of production for larkspur (Table 2).

**Table 2: Flower farm costs in US\$ per larkspur stem**

<b>Larkspur Production Costs</b>	
Larkspur stem	0.105
Post-harvest	0.060
<b>Total Cost</b>	<b>0.165</b>

### **Impact of contract farming**

Contract farming has provided many benefits for those who have chosen to pursue it (Eaton and Shepherd, 2001). The following section presents the key challenges and impacts of the implemented contract farming model for both the flower farm and the contract growers.

### **The challenge of farmer participation**

Farmers were initially reluctant to become contract growers because they had no experience producing cut flowers, let alone for an export market with stricter quality standards. It was only when the technician successfully secured Pablo Nachez<sup>24</sup>, a very well-known and respected farmer, as the first contract producer that other farmers became interested in the program. Mr Nachez was the key to getting collective farmer participation as he served as the business leader who freely communicated his business and financial success with contract larkspur production with the other farmers.

### **Profitability per hectare**

Larkspur production is highly profitable relative to farmers' alternative cash crops. First, larkspur prices are established on a pricing schedule based upon set quality measures that are provided to farmers prior to planting. This reduces price uncertainty for farmers. Local vegetable prices are traditionally highly volatile.

Second, the higher quality inputs, greater planting densities, and reduced pest and disease management costs ensured that contract producers achieved higher yields and returns per hectare with larkspur than alternative vegetable crops. Even if farmers can only successfully harvest 50 percent of their larkspur, they will still break even.

Third, farmers become more efficient reducing their costs of production (Table 3).

**Table 3: Vegetable Farmer Costs per larkspur stem (US\$)**

<b>Larkspur Production Costs</b>	
Transplant	0.015
Labour and chemicals	0.065
Total Cost	0.080

Farmers noted that immediate access to market information and technical support allowed them to become more efficient and responsive to changing market needs and requirements, which minimized their losses and maximized profits.

Finally, integrating larkspur to the rotation schedule caused minimal disruption to the farmers' current production practices: no new investments were required and the same fertilizers and chemicals could be applied to both larkspur and other vegetables using the same application systems. Consequently, as one farmer noted, "the amount of money earned for larkspur, when compared to the same size area planted in another vegetable crop, earns three times more money". Thus, larkspur offered vegetable farmers a profitable alternative within their current rotational cropping systems. It was so profitable that some farmers were willing to rent extra land to increase their larkspur production.

For the export flower farm, profits have increased on larkspur sales while their costs have decreased. The flower farm only contracts out the necessary land area to produce the required amount of larkspur to meet their expected market demand. By producing

<sup>24</sup> Names have been changed to protect the farmer's identity.

larkspur off the farm, they no longer incur the production costs: just the post-harvest costs and technician's salary. Additionally, as the contract farmers' quality increases, so do their margins (Table 4).

**Table 4: Market prices and flower farm revenues for larkspur (US\$ per stem)**

<b>Stem Length</b>	<b>Market Prices</b>	<b>Flower Farm Costs</b>	<b>Revenue</b>
60 cm	0.18	0.0165	0.015
70 cm	0.20	0.0165	0.035
80 cm	0.22	0.0165	0.055
90–100 cm	0.24	0.0165	0.075

### **Knowledge transfer and technology spillovers**

The export flower farm provides contract producers with free technical support. The technician provides a critical knowledge transfer and monitoring role for both the contract farmers and the exporting farm. He meets twice a week with each farmer. During these meetings he provides the latest best practice knowledge on production, disease and pest management, and specific recommendations for any observable or anticipated problems. He also offers free assistance on any problems related to other crops that may directly affect the larkspur quality.

### **Self-enforcing contracts**

The contractual agreement is based upon a self-enforcing verbal agreement<sup>25</sup>: prices are transparent; contractual requirements and payment structures are known in advance; critical monitoring and feedback loops are included; and technical assistance is provided to ensure success.

For the contracted vegetable grower, profitability increases with increased quality, quantity and efficiency. The number of high-quality stems per hectare is solely determined by the farmers' management systems. The free technical assistance not only ensures success, but also provides large positive spillovers for a farmer's other vegetable crops. These large spillovers help enforce the contractual arrangement. Additionally, the contract farmers purchase the plant inputs, grown by the farm for larkspur from the flower farm on credit, further securing the contractual agreement.

The flower farm possesses an effective monopsony purchasing position. Thus there is little risk of the contract farmers shirking. Additionally, the firm directly benefits from farmers' higher-quality larkspur. Therefore the incentive structure is properly aligned to ensure self-enforcement.

### **Market access**

Contract farming allows the small farmers to overcome the capital, technological, organizational and coordination barriers that often exclude similar-sized producers from participating in high-value export markets (Eaton and Shepherd, 2001).

<sup>25</sup> See Gow *et al.* (2000) and Gow and Swinnen (1998) for a discussion of self-enforcing contracts.



### **Supply assurance and production flexibility**

The market demand for larkspur in the American market is steady all year round except for seasonal highs at Valentine's Day and Mother's Day. By contracting, the export flower farm is no longer required to own or rent land: instead, contracting allows great flexibility in matching land use to seasonal demand fluctuations. Contract farmers are happy to produce larkspur as it is highly profitable and fits easily within their current rotational systems. Contracting also provides a natural screening and selection mechanism for identifying the best and most reliable contract farmers: only the best growers are offered year round contracts, whereas newer or less reliable farmers are only contracted to meet peak demand periods. The model has now become so popular that even if someone was to drop out there would be another farmer ready to join.

### **Labour flexibility**

The contract incentive structure has allowed the flower farm to reduce labour, supervision and management costs substantially, while simultaneously increasing product quality and flexibility. Today, the export flower farm only employs the technician to support contract growers and some post-harvest labour for final packaging and shipping.

### **Secondary spillover effects**

Larkspur requires more labour and inputs than traditional crops. Thus contract farmers typically hire more labourers. This translates into increased on-farm opportunities for people in the area which leads to additional spillovers and linkages within the local economy. Most farmers do not own trucks or tractors, therefore, a local transport industry has developed to ship larkspur to the export farm.

## **Discussion**

Contract farming has long been used as a form of market organization within developing countries. However, differing levels of success have resulted in substantial debate and conflict about its appropriateness (Watts and Little, 1984). Eaton and Shepherd (2001) point out that the key to successful contract farming is the development of the necessary forward and backward linkages. These linkages provide both reliable and cost-efficient inputs such as extension advice, mechanization services, seeds, fertilizers and credit, and guaranteed and profitable markets for the output. We now identify the linkages and components that are critical to the success of this case study to ensure mutual commitment on both sides.

**Dollarization provided a stable business environment:** Compared to the standard FDI-induced contract farming literature where the foreign firm provides quasi-market stability (Gow and Swinnen, 1998; 2001; Gow *et al.*, 2005), this case study shows that dollarization can provide a stable business environmental suitable for domestic firms to produce substantial economic benefits when combined with an American dollar-denominated export market.

**Contract farming was a commercial decision:** Contracting was a mutual beneficial response by both parties to specific economical and financial needs.

**Extension and technology assistance** reinforced the mutual commitment.

**Larkspur's low production risk, location specificity and rotation requirements** provided low entry barriers for new farmers.

**Cost and price transparency** properly aligned incentives on both sides.

**The business leader**, Mr Nachez, was critical to the projects' success, as he not only understood the value proposition and could communicate it, but he also possessed substantial social capital and reputation within the farmer community.

**Technological spillovers** from the agronomical support not only supported larkspur production but assisted farmers increase profitability for all of their crops.

### Conclusions

This case study analyses and evaluates the critical factors that contributed to the adoption, diffusion and success of a contract production model implemented by a medium-sized Ecuadorian cut flower grower–export with small local vegetable producers. The case provides a comprehensive understanding of the reasoning behind why the firm initiated the organizational and institutional innovation and how it was implemented. The dollarization of the factor markets coupled with an American dollar-denominated export market were critical in providing the appropriate business environment and incentives for this innovation to occur.

The results and impact provide an in-depth understanding of the critical factors required for success. This firm is by no means the only example of a successful development of a business model which offers a sustainable competitive advantage, but it is a legitimate example of the success experienced by a firm as a result of developing solutions outside the firm. The success of this model is based on the mutually reinforcing incentive structures for both parties. Success is further strengthened by the appropriateness of the crop and the production knowledge of the firm, based on years of its own experiences producing larkspur.

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## **Participation of a small-scale women processing group in the dynamic potato market in Thailand**

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### **Abstract**

*Potato was introduced to highland farmers in the 1960s; however it only became an important cash crop in the 1990s. The main potato planting areas are in the north of Thailand. Two types of potatoes are cultivated: processing potatoes (Atlantic), which accounts for 90 percent of total production, and table potatoes (Spunta). The domestic demand for processing potato has been increasing due to the popularity of potato chips and potato crackers. The main potato production area is in the North region, especially Chiang Mai Province. Potato growers in this district take advantage of the preferred soil and temperature as well as the technology and knowledge provided by government and non-government agencies to produce good-quality potato. In 2005, processing potato production from Chiang Mai accounted for 53 percent of total production (51 216 tonnes). Ninety percent of processing potatoes is absorbed and produced into potato chips by two large firms, while 10 percent of production is of substandard potatoes. The study found a housewives' group in San Sai District of Chiang Mai which has been able to generate additional alternative family income from the substandard potatoes as well as to be a small enterprise participating in the potato supply chain. A farmer housewives' group called Chedi Mae Kreow (CMK) was established to make use of poor quality potatoes. The CMK is most successful and thus is selected to illustrate a business model for a community enterprise. The keys to the success of the group are ability in business management and product development as well as the continuous support from the government. CMK turned the product previously sold as animal feed (at 1–2 baht per kilogram) into material worth 2–5 baht per kilogram. CMK supplies potato chips and snacks mostly to schools and local retail shops. Although the CMK delivers some of its products to stores in the city and modern supermarkets, this channel is not the most profitable, as the economies of scale are a significant factor in determining the costs of marketing. However, the CMK group still participates in the modern chain by producing products under the supermarket's own brand name. In 2006, CMK utilized 200 tonnes of defective potatoes, which is expected to increase by 50 percent in 2007.*

### **Introduction**

Potato is an exotic crop to Thailand, introduced as a cash crop to highland farmers in the northern region in the 1960s. There are two main types of potatoes available in the country; table and processing types. The main variety of table type is Spunta and the processing type is Atlantic. Most potato grown in Thailand is of Atlantic variety, which accounts for 90 percent of total production. Potato is one of the few crops on which the Thai Government has imposed supply control.. Since quality tuber seeds need to be imported, the annual extent of imported table type seeds has been determined by the

National Sub-committee on Production and Marketing Management for Garlic, Shallot, Onion, and Potato. In 2006, the Government permitted 302 tonnes of Spunta seed to be imported with tariff exemption, to prevent undesirable farm prices. The processing potato has been planted partly by firms and mostly by contracted farmers just like the case of other industrial crops. Therefore the quantity of seeds imported is allowed based on the requirements of the processing firms. Potato became an important cash crop in the 1990s due to increase in domestic demand for potato chips and demand for western food restaurants associated with greater popularity of tourism to Thailand.

### Demand for potato

Thai people consume potatoes mainly in two food categories, i.e. snacks (crisps, crackers, etc.) and cooked table potato in soup and curry. With the change in their consumption style, demand for potato snacks and for western fast food has increased rapidly. The growth of consumption of French fries and potato crisps was estimated at 30–50 percent per year from 1992 to 1995. Furthermore, the demand for potato from the processing industry increased from 118 000 tonnes in 1997/1998 to 165 390 tonnes in 2005 (this includes all forms of potato materials such as fresh chilled, frozen, flour, meal and powder, flakes, starch). The highest demand was 171 500 tonnes in 2003 (see Table 1).

**Table 1: Demand of potato in Thailand and imports**

	Domestic production	Imports	Total demand	Percentage of domestic production to total demand	Percentage of imported potato to total demand
1996	65.14	25.39	90.53	71.95	28.05
1997	89.55	28.45	118	75.89	24.11
1998	93.78	29.81	123.59	75.88	24.12
1999	90.38	35.4	125.78	71.86	28.14
2000	100.12	48.39	148.51	67.42	32.58
2001	90.94	43.13	134.07	67.83	32.17
2002	97.37	43.28	140.65	69.23	30.77
2003	86.73	84.77	171.5	50.57	49.43
2004	99.81	63.38	163.19	61.16	38.84
2005	97.41	67.98	165.39	58.90	41.10

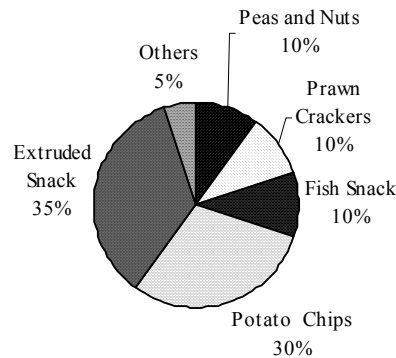
Source: Department of Customs, 2006

Although potato snacks are not authentic to Thais, the consumption and demand for potato in Thailand is far beyond domestic production (USDA, 2004). For example, in 2005 the total output was about 97 410 tonnes, with the demand at 165 000 tonnes in total (Office of Agricultural Economics, 2006; Department of Customs, 2006). Thus imports satisfied 41 percent of the total demand.

Thailand is known as one of the largest markets for snacks in Asia and the Pacific. In 2003, the value of snack consumption reached US\$280 million (USDA, 2004). There were 2 000 brands available on the shelves. In 2002, snacks made of potato flour and granules gained the highest share (35 percent) in the snacks market followed by crisps

(30 percent). Other main snacks included peas or nuts, shrimp crackers and fish snacks with 10 percent market share each (see Figure 1).

**Figure 1: Market shares of snacks in Thailand (2002)**



Source: USDA (2004)

For crisps alone, the figure in 2005 indicated its value as high as Bt 308 billion. The processing firms forecast that the market for this particular product would have at least 10 percent increase annually for 2006 and 2007. Despite this attractive figure of growth, consumption per head on the average is only 1 kg per year, which is 50 percent less than the average in the Republic of Korea or Japan (USDA, 2004; Siamturakij, 2006).

### Supply

The expansion of potato production in the past 15 years was due mainly to market certainty and large absorption by the processing industry. At the initial stage, potato production expanded slowly as its production was absorbed by the fresh food market and slow growth in demand for processed potato. In 2005, the total production area was 4 950 ha and about 95 percent of the planted land was in the North. The national production reached 97 411 tonnes in 2005. Presently, potato is ranked as a major crop of the North, especially for Chiang Mai, Tak and Chiang Rai provinces (OAE, 2006). Table 2 shows the potato production by the different provinces of Thailand.

Area planted under potato is scattered in eight provinces in the northern and northeastern regions. Chiang Mai, one of the provinces in the North region, is the main potato producing area, which accounted for 53 percent of total production in 2005. Potato growers in this province take advantage of the favourable soil and climate conditions as well as the technology and knowledge provided by government and non-government agencies to produce good-quality potato.

Potato is one of the crops having short distribution channels. About 90 percent of the high-quality table potatoes are supplied via wholesalers to restaurants, hotels and supermarkets. As 90 percent of processing potatoes are absorbed and produced into potato chips by two large firms and distributed to middle- and high-income markets, it is rather difficult for the small farmers to be included in the industrial crops supply chain. However, this study found that a housewives' group in San Sai District of Chiang

Mai has been able to generate additional alternative family income from the substandard potatoes as well as to be a small enterprise participating in the potato supply chain.

**Table 2: Potato production by province in 2003–2005**

	Area (rai)			Total Production (tonne)			Yield (kg/rai)			
	2003	2004	2005	2003	2004	2005	2003	2004	2005	
Whole country	42 184	43 890	42 817	86 732	99 813	97 411	2 081	2 291	2 288	
North	Chiang Rai	2 173	2 834	2 818	3 392	5 750	5 743	1 592	2 068	2 053
	Lampang	875	2 241	2 180	1 289	3 169	3 087	1 494	1 422	1 422
	Lamphun	1 299	1 723	1 688	1 786	2 843	2 802	1 703	1 738	1 695
	Chiang Mai	23 043	1 833	21 080	44 237	52 785	51 216	1 930	2 438	2 444
	Tak	12 279	13 192	13 042	30 054	29 613	29 211	2 461	2 245	2 247
Northeast	Loey	292	400	382	825	1 481	1 404	2 825	3 703	3 724
	Nongkai	1 301	700	695	3 099	1 960	1 888	2 382	2 800	2 744
	Sakhonakorn	922	967	932	2 050	2 212	2 060	2 223	2 287	2 222

Source: Office of Agricultural Economics, 2006

Note: 1 rai = 166 m<sup>2</sup>

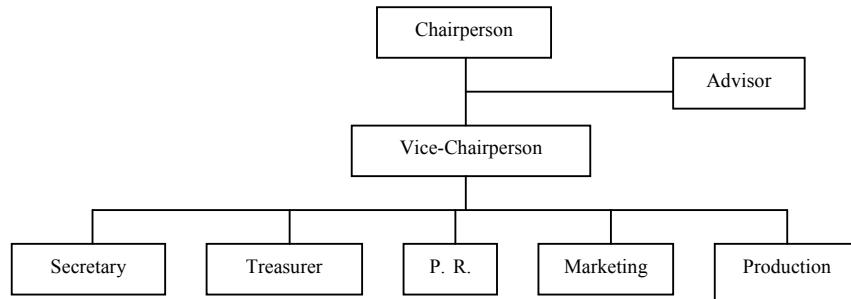
#### **Local small scale processing group: the Farmers' Housewives group in Chiang Mai**

After the economic crisis in 1997, many policy measures were launched to accelerate the establishment of local groups to create local employment and income. The Housewives' Group of Chedi-Mae Krew (CMK) is a community enterprise in San Sai District which was formed with the support from the District Office of Agriculture to produce potato chips by using substandard potatoes, of which the quantity has increased, along with the expansion of total production. The group provides an alternative to potato growers to gain higher income from selling defective produce. Substandard potatoes were sold to the group at Bt 2–5/kg instead of Bt 1–2 purchased by dairy farms.

At the beginning the group included 40 (later 42) members; each holds at least one share of Bt 100. The initial capital of the group, worth Bt 71 100, enabled the group to invest in production equipment and raw materials (Wiboonpongse *et al.*, 2005). The CMK expanded its function to provide saving and credit activities. This, in turn, allowed the CMK to absorb more defective potato. The keys to the success of the group are its ability in business management and product development as well as the continuous support from the government.

#### **Management**

The ability in management of the leader and committee members was the important strength leading to the success of the group. As a registered group under a policy aimed at accelerating income to strengthen the local community, the CMK was required to have a clear organizational structure. The Board or Committee comprises a chairperson and relevant committee members, as illustrated in Figure 2.

**Figure 2: Organizational structure of the CMK**

Source: Wiboonpongse *et al.*, 2005

Unlike most other housewives' groups, the CMK's committee members were able to handle each of their responsibilities rather well. The leader's particular responsibility to the CMK group has been the overall planning and monitoring work plan, coordinating with government agencies and attending local meetings.

The leader and advisor are the key persons to the success of the group. The chairperson, Mrs Boukham Wipasa, completed only 4 years of formal education. Her major occupation is farming. However, with her personnel ability and nature she has played several roles in the community. The advisor of the group is the chairperson's husband who has played significant roles in marketing and advising. His background on cooperative management provides business-oriented attitudes, concepts and a progressive approach to the group management. The committee members have had 4–13 years of formal education; however, they have had the chance to gain knowledge from the government agencies frequently which enhances their ability to handle each of their responsibilities rather well. Furthermore the group frequently seeks technical advice from the local universities and government agencies on processing, product development as well as marketing to increase the efficiency on product development and marketing management.

### **Production**

The key point of the CMK to produce good quality potato chips from rejected potatoes is the continuous product development by the group as well as knowledge and technology support from the government. The group has received support mostly in terms of production equipment and packaging machinery (approximately Bt 1.1 million in cash and loan). The CMK invested out of its own pocket about Bt 0.28 million which accounted for only 19 percent of the total investment (Wiboonpongse *et al.*, 2005). The main sources of support were:

1. The District Office of Agricultural provided cleaning and small slicing machinery as well as the fund for purchasing raw material.
2. The Department of Cooperatives Promotion provided aluminum foil packages and related equipment, and knowledge on group management.
3. Chiang Mai University provided the knowledge to run a business and longan-drying oven for grease reduction in fried chips.



It should be noted that the good access to government agencies is due to the social and business network of Mrs Baukham's husband.

### **Product**

The group processed potato chips in a simple processing plant; however, its products are accepted as having good quality by consumers. In 1997, the CMK began with only two products: dried potato called "Mankalaya" and crackers produced from Spunta variety. The production season was limited to three to four months during the hot season since potatoes needed sun drying. In the following year, with the support from the District Office of Agriculture, the same product form as produced by large firms was processed into chips from the substandard potatoes.

At the initial stage, the group sold chips contained in simple plastic bags in bulk (0.5–5 kg/bag) without brand for local markets within the district. After joining the exhibition and fairs organized by government agencies in Bangkok and other provinces, the CMK realized its market potentials and observed and learned from other advanced groups' products. The CMK reduced packaging to serving sizes with a sticker of the group's name as its brand name. Apart from price, taste of potato chips is very important to satisfy consumer preference in the market. Therefore, the group tried to purchase flavouring powder from the same source as the large potato processing firms. In 1999, the CMK's crisp chips became popular at the district level and the original chip was followed by other flavours to match changes in consumers' preference as influenced by large firms. During the past five years, the group has improved its products and packaging substantially. Efforts on packaging were recognized as being distinguished as compared to other groups of the same kind. Products and packages are diversified so as to serve different target consumers. Presently, the group produces a variety of flavours and packages of its products to serve different markets (Table 3).

**Table 3: Products and the target markets**

<b>Type of packaging</b>	<b>Weight</b>	<b>Market</b>
simple plastic bags	0.5–5 kg	wholesale in village and other provinces (30 percent)
simple plastic bags with its brand	60 g, 40 g, 20 g	wholesale and retail in village and other provinces (30 percent)
aluminum foil with colourful bags	40 g, 20 g	cooperative shops in universities and supermarkets (20 percent)
simple plastic bags with its brand	Packed to order	wholesale in village and other provinces (20 percent)

### **Raw material**

The CMK purchased substandard potatoes rejected by the firms from members, brokers and the processing firms to use as raw material. Most unsold potatoes were rejected due to abnormal shape or poor harvest handling; they were usually wounded and unstorageable for seed. Therefore the characteristics related to fried-chip quality such as sugar and flour contents were rather suitable to process potato chips. The group takes advantage from being located in the neighbourhood of the cultivation areas and processing plants.

The group has enabled potato growers to sell the defective outputs as useful raw materials for snack processing at Bt 2–5/kg instead of their selling as animal feed at Bt 1–2/kg. In 2004 the group brought 50 tonnes of substandard potatoes, but half of all purchased potatoes were lost because of improper storage. The group tried to solve this problem by conducting experiments to preserve potatoes under 25°C in cool rooms; this helped prolong storage life of the raw material. In 2006 the CMK absorbed 200 tonnes of substandard produce, which accounted for 35 percent of total substandard potatoes in Chiang Mai province. The value added to defective potatoes in 2006 was about Bt 600 000 and it is expected to increase by 50 percent in 2007.

### **Employment**

The group employed its members to work in the processing plant. The employees earn salary as well as other welfare benefits from the group. In 2004, 13 members were employed at Bt 120 per day to work once a week. After the market expansion in 2006, the CMK hired five permanent employees working five days a week and increased the wage rate to Bt 150 per day. Thus the worth of income distributed to members increased from Bt 74 880 in 2003 to Bt 195 000 in 2006.

### **Marketing**

Pricing and niche marketing are the key strategies to expand one's market. At the initial stage, the target customers were students and local people in the community. While other groups aimed only at local markets (within the district), the CMK improved its packaging and extended its market boundary. By joining the exhibitions and fairs organized by the government agencies in other provinces, the group could expand its market to other provinces, especially Bangkok.

Market channels of the group have changed since 1997. The group could expand its market to other provinces as well as increase its total sales dramatically. The share of total sales to other provinces increased from 10 percent in 1997 to 55 percent in 2006. The value of total sales increased from Bt 317 380 in 2003 to Bt 1 080 000 in 2006.

The CMK had experience in participating in modern supply chains. In 2004, the group supplied potato chips in aluminum foil packages to supermarkets; however, this channel was not successful. The problems causing the group to give up this channel were:

1. The credit term (45 days) is too long, causing cash flow problems.
2. The commission rate is too high.
3. The group's products are not well known compared to other famous brand names, thus low rate of turnover.
4. Expired products add to high unit marketing cost.
5. Being a small brand, the products are placed in non-attractive shelf positions .

The CMK takes an advantage from the increase in demand for potato chips influenced by the advertisement of large firms. Thus, the group produces similar products to catch up with the demand led by famous brand names.

The present market strategies of the CMK are:

1. Target customers are middle- and local-market segments to avoid high competition in upper market.
  - School children and teenagers are major consumers.
  - Cooperative shops in universities.
2. The CMK has maintained its opportunity to supply products to the upper-end customer as it has access to a special corner assigned for community products in supermarkets to get wider customers' attention.
3. The prices of the group's products were set slightly lower than those of the famous brands while net weights were greater to compete with the famous brand names .
4. For production expansion, in the near future some products will be made-to-order and marketed by modern supermarkets under their own brand names.

Along with production expansion, the CMK also plans to improve its marketing management by hiring marketing personnel and adopt more aggressive marketing strategies.

#### **The CMK as an alternative for the farmers' participation in the supply chain**

The CMK is a group of potato growers' housewives which was set up to be an alternative for small growers to increase income from substandard potatoes as well as to be a small enterprise participating in the potato supply chain .The group could provide benefits to potato growers as well as an opportunity to participate in the potato supply chain.

#### **Benefit to the growers**

- Financial gain received by the members from selling damaged or defective and unacceptable potatoes both Atlantic and Spunta varieties (at Bt 2–5/kg).
- The incremental value of Bt 600 000 to the price of defective potatoes as animal feed, means a significant contribution of the CMK to the income of growers, both CMK members and non-members'.

#### **Inclusion of the CMK in market dynamic**

- Despite 90 percent of market share for potato chip in Thailand held by two large firms which grew 25–30 percent annually, the CMK could increase its sales value from Bt 0.3 million to Bt 1.08 million in the recent years .
- Even though the CMK originally had local and lower markets as target groups, it managed to get involved in the market dynamic by supplying products to the same target groups as the large firms.

#### **Analysis :lesson learned for the success of small local processor**

- Beside government support in general, the success of the group was attributed to the leader's ability to have better access to support and by personal performance in management and marketing.

- The CMK could promote and expand its market by joining the meeting, fairs and exhibition organized by the government agencies in Bangkok and other provinces .
- The group realized its market potential as well as observed and learned from other advanced groups' products. The group chose the right market segments . Niche marketing is an appropriate concept as long as the group could catch up with trends influenced by large firms.
- The modern supply chain does not have much room for small-scale producers due to economies of scale in marketing activities especially placing and advertizing .
- As an alternative, the small producers can participate in the modern chain by (partly) producing products under a supermarket's brand name.

### **Recommendation**

To participate in the market dynamic as demand for potato chips increases, a housewives' group with adequate support can process its farm produce for the local market segment before moving to the upper end segment .This is aimed for market certainty at manageable cost.

With growing concentration in the processing and retail sectors, public policies are required to strengthen marketing and processing knowledge of housewives' groups . This will enable small-scale producers to have alternatives for market participation.

Continuation of public sector's support up to optimal time or level is necessary to help build strong foundation for a community group to proceed at its own pace.

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## **Kentish Garden Growers: a case study of a British farmer cooperative operating in the fresh produce industry**

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### **Abstract**

*KG Fruits Ltd is a cooperative of 80 farmers who all produce berries. The farms are located in England, Wales and Scotland in order to extend the supply season for the company. KG Fruits holds a 45 percent share of the United Kingdom berry market during the local season and supplies all the major retailers. Over 90 percent of the cooperative's produce is sold to supermarkets. Given its importance as a local supplier, KG Fruits is in a strong bargaining position when dealing with its very demanding customers. The staff members of the cooperative are employed by the farmer-owners to provide services in administration and finance, sales and marketing, and technical support and quality assurance. The role of the staff members is to make sure that the growers send the best quality produce possible to the cooperative in order to avoid rejects and delisting from supermarket supply lists, which could lead to the farmers going bankrupt. The cooperative staff members also organize training in the latest techniques and help farmers to compare their performance through a benchmarking scheme. It also holds preferential rights to the production of new berry varieties developed by a partner breeder. KG Fruits is a model of a successful farmer cooperative with a strong focus on product innovation and quality assurance so as to satisfy its customers.*

### **Introduction**

Kentish Garden Growers Limited and its marketing company Kentish Garden Fruits Limited, known commercially as KGG and KGF respectively, are farmer-owned companies that are in the business of marketing strawberries, raspberries, blueberries, blackberries and related specialty fruit (e.g. gooseberries, red currants). All these fruits are produced by the companies' owners: the farmers. The company also markets similar fruits imported from overseas sources. KGG was established under the United Kingdom Industrial and Provident Society Act and owns 100 percent of the shares of KGF. The cooperative has been in business for 35 years and is the single largest supplier in the British fresh berry market. In this case study, the structure, history, commercial track record and future plans of the cooperative are examined. Conclusions are drawn as to the contribution that KGG has made to the commercial welfare of its grower owners, and its appropriateness as a model for other grower groups in developed and developing countries.

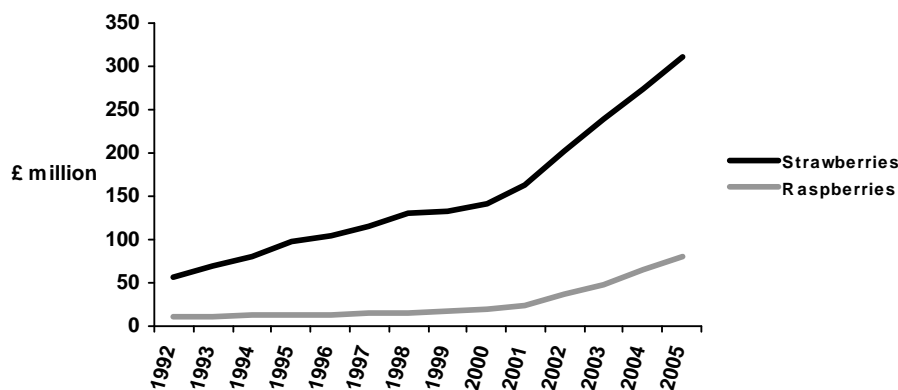
### Commercial context – the fresh berry market in the United Kingdom

The British market for fresh fruits and vegetables (indeed, for food products in general) is dominated by the supermarkets. Specifically, 90 percent of retail sales of fresh produce are via supermarkets (the “modern” retail trade), with seven companies accounting for the majority of this total, viz. Tesco, Asda/WalMart, J Sainsbury, Morrison’s, Somerfield, Waitrose and Marks & Spencer (TNS 2006). These supermarkets source produce directly from suppliers and do not use the services of wholesale markets. Approximately, 10 percent of fresh produce reaches final customers via a network of wholesale markets across the United Kingdom. Such markets service independent, small-scale (“mom and pop”) retailers and the food service trade. Over the past 30 years, supermarkets have grown their share of the retail trade in fresh produce from 40 percent to the current figure of 90 percent, and the wholesale markets continue to lose market share.

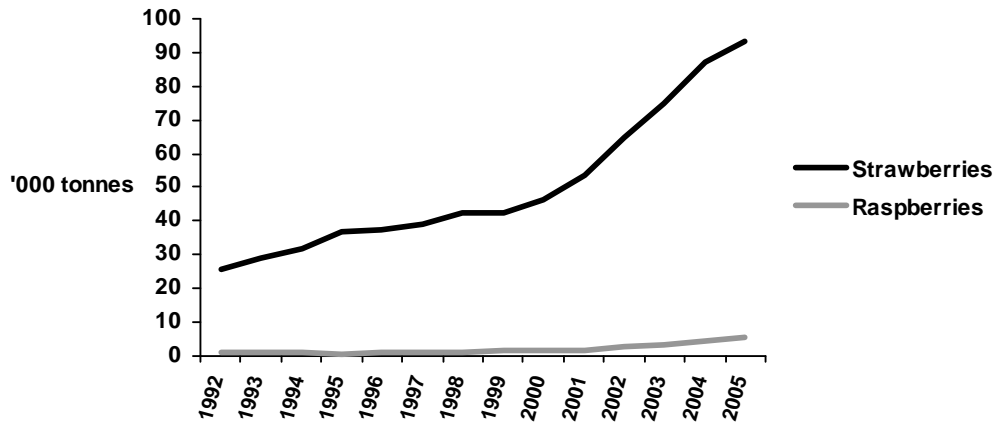
The proportion of the average British households’ disposable income spent on food is around 16 percent. Approximately two-thirds of this is spent on “food at home”, i.e. food purchased by shoppers from retail establishments for consumption at home; and one-third on “food away from home”, i.e. food bought from restaurants, fast food outlets, etc. However, for fresh fruit and vegetables, even more are purchased for “at home” use, i.e. 80 percent of the total.

Over the past decade, market conditions for many fresh produce items have been challenging. Unit values have been under pressure and per capita consumption has been flat (e.g. fresh potatoes, apples, oranges). However, the market for berries is far from being mature; fresh berries have seen significant growth and continue to see year-on-year increases in total volume and total value (Figures 1 and 2).

**Figure 1: Development of the strawberry and raspberry markets in the United Kingdom, 1992-2005, £ million**



**Figure 2: Development of the British strawberry and raspberry markets, 1992-2005, thousand tonnes**



However, for both strawberries and raspberries, unit values have been under pressure (e.g. strawberry prices to growers from supermarket customers have remained at close to £3/kg over the period 2004–2006). Yet, household penetration (the proportion of households in the United Kingdom buying berries at any time during the year) is still relatively low, particularly for raspberries where only one-quarter of families bought them in 2005, indicating that there is still substantial potential for this crop (Table 1).

**Table 1: Household penetration of berry sales in the United Kingdom (percentage of households buying berries)**

	Proportion of households buying (percent)	Purchases per year for those buying
Strawberries	73	9
Raspberries	24	5
Blueberries	10	4
Blackberries	4	2

Source: TNS (2005)

In the main berry “season”, the period between May and October when British fresh berries are the principal source of supply in the market, KGG berries account for over 40 percent of total domestic supplies. There are three other principal British suppliers during this period (Berry World, Angus Soft Fruits, and S&A Davies). During the minor season (November to April), imports dominate the market, with Spanish-sourced produce being available in March–May and October or early-November, and Egypt and Israel being the main suppliers for strawberries during late-November through to February. Blueberries are imported all year, as there is only a fledgling grower base in the United Kingdom for this product. Raspberries are also a significant import item – from Spain, Mexico, the United States of America and South Africa, although British supplies in the summer season are expanding rapidly.

### **KGG: the genesis and development of the cooperative**

In 1971 seven strawberry growers from the English county of Kent decided that there could be mutual benefit if they pooled resources to hire a truck to transport their berries from their respective farms to regional wholesale markets in England. Previously, the growers had been “booking space” with transport companies to move individual pallets of fruit from their farms to, say, Liverpool wholesale market. They determined that better transport prices could be negotiated if they acted in concert. Often, the produce was destined for the same wholesale buyer and, as a result, the growers quickly took the view that it would be even more in their interests if they combined their sales and offered a greater critical mass of produce. In 1972, the seven growers established Kentish Garden Growers Cooperative, under the Industrial and Provident Society Act. This was a period when the Ministry of Agriculture, Food and Fisheries (MAFF) was actively encouraging individual farmers to act collectively in marketing their produce and purchasing farm inputs. KGG received a MAFF grant to undertake a feasibility study to establish KGG and, subsequently, to provide technical assistance to set up the organization.

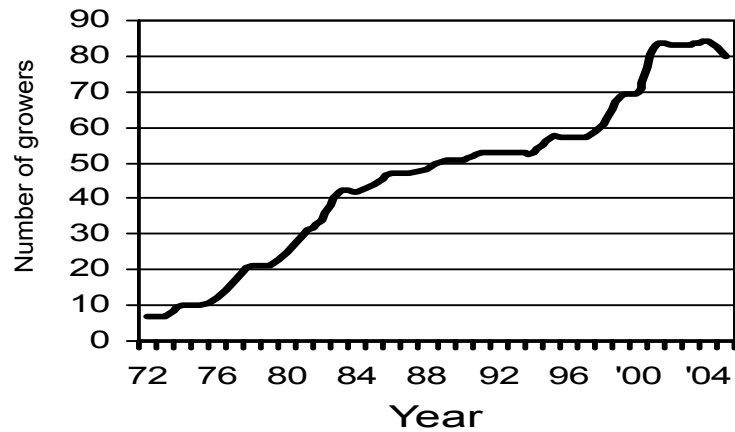
The seven KGG members took an early view that they were best at producing fruit and a third party marketing firm (AFI Limited) could most efficiently find sales and market the growers’ fruit. Additionally, AFI undertook to handle all sales administration, logistics and quality assurance on a commission basis. Over the following 23 years, the cooperative expanded from its original membership to 55 growers and sales climbed to £15 million per annum. KGG and AFI became a national supplier to all wholesale markets and increasingly, the principal supplier to the burgeoning supermarket sector. In doing so, the original grower membership came to terms with the fact that berry growers in adjacent counties (e.g. Sussex, Herefordshire) and, further north, in Scotland were not competitors but strategic partners in expanding the geographic coverage and sales volumes to emerging large-scale customers. Moreover, KGG tasked AFI with a further function to purchase major inputs in bulk on behalf of the KGG members (e.g. berry plants, fertilizer).

In 1995, the KGG members took the decision that they needed to “take ownership” of the sales and marketing of their berries. This came about because it became increasingly evident that the value of KGG as a business was largely dependent upon the trading relationships it was developing with the principal supermarkets. Heretofore, this relationship was owned by the third party marketing agent, AFI. As a result, KGG hired a sales-and-marketing team, with full administrative support, plus quality assurance (QA) and set up in business under the KGF banner. Kentish Garden Fruits became the wholly-owned marketing arm of the cooperative. This was a brave and far-sighted move and one which other cooperatives in history have taken and, subsequently, regretted. Perhaps, the most perspicacious decision was taken by the cooperative’s Board of Directors in the selection of a managing director for KGF. The directors looked to the future and “dreamt” of the type and size of organization they wished to see in place by 2005 (10 years on). The “dream” was to have KGF as the leading berry marketing firm in the United Kingdom, with a turnover of £100 million or more. With this in mind, the growers hired a managing director whom they believed had the qualities to turn a £15 million business into a £100+ million business, whilst still retaining the confidence of

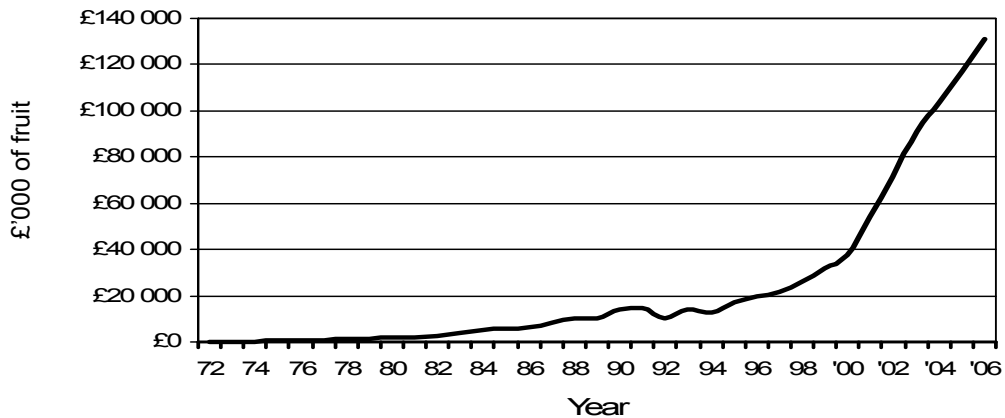


the grower-owners. The progress made by KGG and KGF from inception and, particularly over the period 1995 to 2006, is presented in Figures 3 and 4.

**Figure 3: KGG grower members 1972–2006**



**Figure 4: KGG total sales 1972–2006**



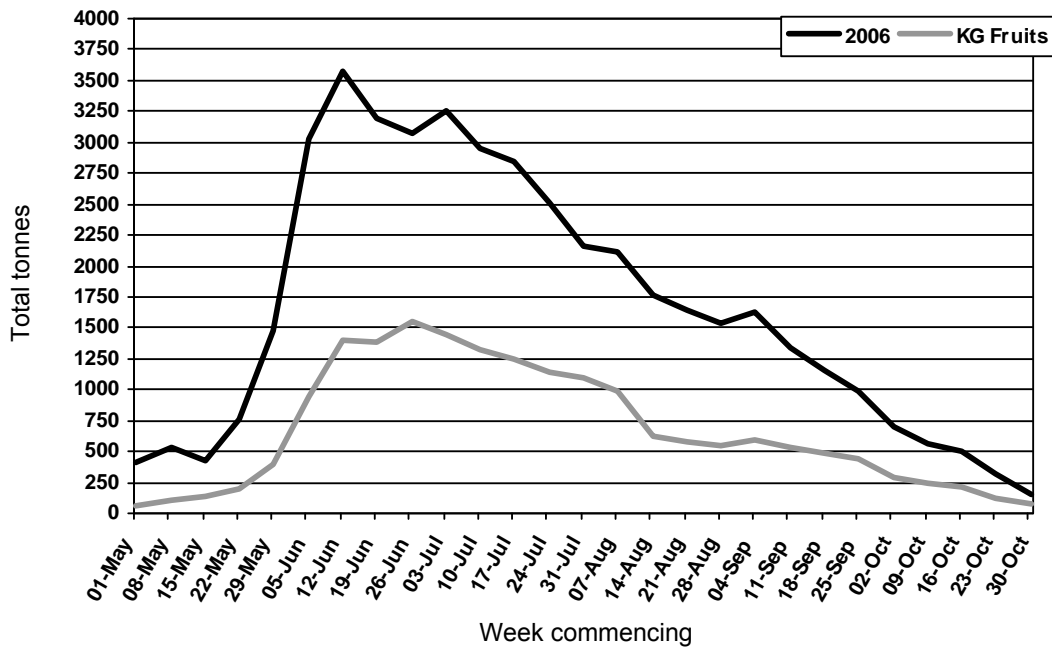
Over the past ten years, KGF has seen turnover increase from £24 million to £131 million, with fruit grown in the United Kingdom representing £91 million. A substantial import business has been developed (£33 million in 2006) and requisites (inputs bought on behalf of members) reach a modest £7 million (Table 2).

**Table 2: KGG sales, 1997 to 2006**

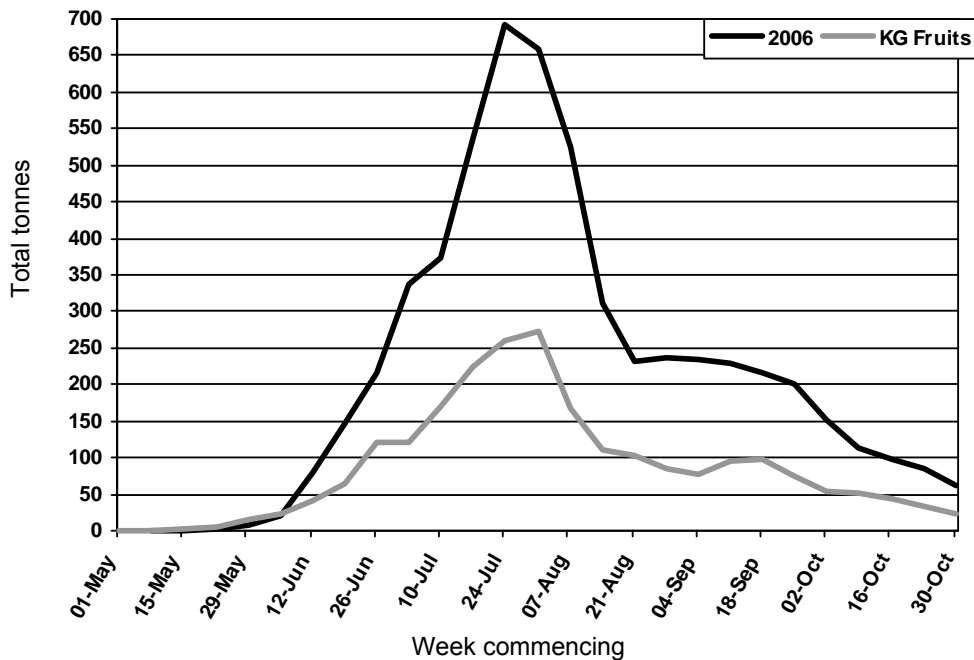
£'000	1997	2000	2003	2004	2005	2006
UK fruit	19.0	31.2	63.0	68.0	80.6	91.5
Imports	2.4	3.5	23.0	29.0	29.3	32.5
Requisites	2.7	3.1	4.9	6.8	7.2	7.4
Group turnover	24.1	37.8	90.9	103.8	117.1	131.4

In 2006, KGG had reserves of £5.5 million. Its customer portfolio included all the principal supermarket businesses in the United Kingdom: Waitrose, Tesco, Marks & Spencer, Costco, Sainsbury's, Asda, Morrisons and Coop. The importance of KGG/KGF in total domestic supply of strawberries and raspberries during the British domestic season for 2006 is shown in Figures 5 and 6.

**Figure 5: British strawberry sales 2006 vs. KGG strawberry supply**



**Figure 6: United Kingdom raspberry sales 2006 vs. KGG raspberry supply**



### **KGG and KGF: ethos and cooperative organization**

Farmers are small-scale business people and, like independent businesses in other industries, cooperating with other similar businesses in their sector does not come easily. Many cooperatives fail for a variety of reasons, but not least, the lack of trust between members. KGG identified “lack of trust” as being its biggest risk constraining the evolution of the overall business; whether lack of trust between members (“he’s being treated better than me by the sales team”), or between grower members and the employees of KGF who were and still are responsible for selling the grower members’ fruit (“you didn’t get me the best price”). The cooperative does not pool fruit, i.e. each member’s fruit is sold to a specific buyer (usually a supermarket), and the grower receives the return that the sales team can extract from each buyer. As a result, growers receive different prices from each other, depending on which customer they are serving<sup>26</sup>.

Through time KGG has developed a set of cooperative organization values that remind its owners, employees, customers and other stakeholders what KGG stands for (Box 1). These are much more than fine words and, whenever difficult decisions are being made, the values provide a reference point to remind the Board of how it should act and behave. The mission statement of KGG and KGF is also shown in Box 1. The cooperative aims to be the biggest business in the British berry market. Size is important not just for aggrandizement, but to ensure that the cooperative can have a degree of countervailing power *vis-à-vis* the very powerful supermarket companies and, just as importantly, to generate funds that can be reinvested to improve the future competitiveness of the cooperative and its grower owners. Indeed, KGG has a clear idea of the preferred characteristics of a twenty-first century fresh produce business.

KGG is governed by a Board of Directors which comprises nine growers (chairman and vice-chairman, plus seven grower members), two non-executive directors (completely independent of the business and the sector), and a company secretary (the finance director [FD] of KGF). Routinely, the managing director (MD), sales and marketing director (SMD), and technical director (TD) – all employees of KGF – are invited and the Board meets four times a year.

The KGF Board oversees the commercial business of the cooperative and meets monthly. The KGF Board comprises four grower–directors (the chair and vice-chair of KGG, plus two grower–directors who are also KGG directors), the two non-executive directors of KGG, and the MD, SMD, TD, and FD of KGF. Technically, the grower–directors on the KGF Board can be outvoted by a combination of KGF executives and the non-executives, but this is never an issue because the decisions of the KGF Board are reviewed by the grower-majority KGG Board. What is more, the KGF Board operates on a consensus basis for all decisions anyway!

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<sup>26</sup> Most British supermarket firms wish to procure fruit from a known grower base; e.g. Marks & Spencer (M&S) buy fruit from KGF, but on the understanding that the fruit is from approved growers. Indeed, in most cases, the fruit is transported direct from the M&S-approved farm to the M&S regional distribution depot for onward delivery to individual M&S retail stores.

**Box 1: KGG company values, mission statement and vision**

KGG company values

At KG, we seek to be a world-class fresh produce business that gains its strength and reputation from:

- A notable spirit of trustworthiness, honesty, and openness within our organization – between growers and staff – and a passion for self-improvement from grower base to point of final consumer satisfaction;
- Being clear leaders in our world of berries – through scale, technological know-how, supply chain management, and customer understanding;
- Being respected by our customers and competitors for our integrity, professionalism, commercial strength, market knowledge and industry leadership;
- Celebrate and accentuate one great point of difference – grower ownership – to the benefit of all our stakeholders from growers through to consumers.

KGG mission statement

“To be the **largest and most well regarded** soft and stone fruit marketing organisation in the United Kingdom. **To outserve all competition** in the view of producers and customers by being **most cost effective**, by striving to increase KG growers returns, and by investing in the **development of better eating quality products**, which may differentiate us from the competition in terms of product offer and grower profitability.”

KGG vision: principal characteristics of the 21<sup>st</sup> century fresh produce firm

- A five-year vision and strategy for getting there;
- Staff share the vision;
- A food company, not a produce trading company;
- Volume and value growth underpin investment and staff professional development;
- Operational excellence with effective performance measurement systems;
- Outstanding supplier and customer relationship management;
- Innovation in everything – products, services, business systems;
- Continuous investment, despite increasingly tight margins.

Membership of KGG is not open, i.e. new members must apply and be approved by the KGG Board on behalf of all its grower–members. Grower–Directors, in particular, are tasked with ensuring its 80-or-so fellow members are up-to-date and supportive of developments within the cooperative and the companies it owns. Grower politics do exist within KGG, of course, but ensuring constant communications between growers and the executive is an essential element in ensuring that politics are not dominant and that building a better business and future for grower-owners is the paramount *raison d'être* for the Board. Discussion of grower politics at Board meetings has been minimal while over 90 percent of the time has been used to monitor commercial and executive performance and to set strategy for the future of the organization.

Currently, KGG has no employees, as all paid staff is contracted to KGF (with a staff complement of approximately 70). KGF has a head office based near Paddock Wood, Kent (its historical home), and a central pack house in Linton in the south of England which is used to handle imported fruit, and the produce of some of the smaller-scale growers. KGF does have a minor line of premium frozen Scottish raspberries, but freezer facilities are leased from a grower–member.

Larger-scale members pack their own fruit and send direct to supermarket customers, also packing fruit for adjacent smaller-scale growers without their own packing facilities. Growers are charged a commission on fruit sold by KGF, the level of commission reflecting the size of sale (i.e. lower commission rates for larger orders).

KGF has three principal divisions:

1. Sales and marketing which interacts with supermarkets (90 percent of sales) and the wholesale markets (10 percent of sales);
2. The technical division which includes a significant quality assurance resource, plus agronomic technical support for growers, a benchmarking office (an emerging facility which encourages growers to share production cost information with each other to their mutual benefit), and research and development staff focusing on productivity improvements and varietal developments;
3. The finance and administration division, handling invoicing, payments to growers, purchase of shared inputs, etc.

Although KGG is still a farmer cooperative registered under the Industrial and Provident Societies Act, there have been a few significant organizational changes undertaken by the cooperative over its 35 year history, most significantly to move away from the classic cooperative model, viz. one member one vote. Firstly, and as discussed earlier, from 1972 to 1995, KGG hired the services of a third-party sales and marketing company to handle the sales of its berry farmer–members. In 1995 KGG elected to take control of this function itself, forming its own sales and marketing company: KGF. The Grower Board members believed that as sales escalated through the emerging supermarket sector, the relationships being developed between the marketing agency and its supermarket customers were bringing significant value to the “owner” of such relationships. So, it was appropriate that the grower–owners of KGG should be the direct beneficiaries of such, and not a third-party marketing agent.

Second, KGG rules were changed to reflect the growing importance that larger-scale growers had to the present and future success of the organization. Thus, the one-member-one-vote rule was amended to allow larger-scale growers to have a proportionately greater say and ownership in the company. However, the maximum ownership of the organization held by one grower was capped at 10 percent – a figure agreed unanimously by all grower–members.

Thirdly, as the cooperative invested in research and development and marketing over time, it was increasingly recognized that such investments were building significant value in KGG and that the level of investment reflected, to a great extent, the

contribution that individual growers made to the overall profitability of KGG. As such, it was decided that larger-scale growers should have a proportionately higher share of any profits earned by the cooperative over time. As of 2005 a proportion of profits earned by KGG are placed in reserves (worth £5.5 million in 2006): a general reserve account owned by all members and individual account reserves identified with specific members. Now, should a grower member elect to leave KGG (e.g. to retire from the business), the grower can take the reserves from his or her individual account, in effect as a retirement payment.

Thus, with complete agreement across the cooperative membership, ownership and profits are now linked to the value of the member's fruit throughput in the business. This departs from the traditional cooperative model of simply passing all profits back to the grower without leaving any finance for reinvestment in business-building for the future (a problem with many traditional cooperatives around the world).

Since 2000, KGG-KGF has developed close relationships with two strategic partners:

1. Driscoll's, the major global player in the berry world, based in Watsonville, California. KGG has the exclusive right to market Driscoll premium variety berries in the United Kingdom – berries which are grown in the United Kingdom using Driscoll planting material, and Driscoll berries *per se* which are imported from Driscoll production sites around the world (largely, Mexico and the United States of America);
2. Alconeras – a family-owned berry company from Spain which is a major exporter of berries to the United Kingdom and other European countries during the “shoulder seasons” (viz. March–April and October–November).

These strategic partnerships have provided KGG with increased presence and power in the market during the out-of-domestic-season period when the cooperative was historically weak, and with an exclusive source of premium berries for the British market. The latter is particularly important as British retailers are moving towards a “Good, Better, Best” tiered model of fresh produce retailing. The “Good” category is retail code for cheapest, “Better” is regular quality, and “Best” is for premium fruits and vegetables. The KGG view of the commercial world is that British growers will struggle to be the lowest cost producers as competition from Eastern European growers rises – Tesco *et al.* will seek to furnish berries from this source for their “Good” range.

If KGG and its grower base is to secure access to the premium market, then, a secure and exclusive supply of premium genetics is fundamental; thus, the linkage with Driscoll's. Currently, the Driscoll Jubilee variety of strawberry is being grown by KGG members in ever increasing volumes to furnish the requirements of Tesco for its “Finest” (premium) range, and for the premium ranges of other large supermarket chains.

### **KGG developments in 2007**

As of 7 February 2007, the strategic partnership between KGG, Driscoll's and Alconeras has moved on. KGF and the two other companies have merged their

businesses to form a European berry company named BerryGardens. The intent is for the new entity to be the clear leader in the European berry sector within five years, with sales expected to exceed £200 million by end of 2007. The merger rolls into one the commercial sales of berries of the three companies in Europe, plus the R&D initiatives of each partner in their respective countries. This merger is seen to benefit consumers, producers and the berry growers.

As far as consumers are concerned, BerryGardens will be in a position to fulfil the demand of consumers for healthful, flavourful, and good-tasting berries all year-round. By encouraging increased production during periods of low volume, BerryGardens will make additional offerings available for consumers to purchase at better value. Furthermore, one of the goals of the new company's breeding programme is to improve the quality, taste, appearance and eating experience of the berry category. Moreover, with BerryGardens' combined resources, knowledge and experience with the trade, the new company will be in a position to meet the demands of the customer which may include category management, automatic order replenishment, customized labelling, and other ever-increasing duties and services demanded by customers. The new company's year-round berry offer will include or exceed all customers' food safety requirements. Finally, BerryGardens will be able to assist customers in developing their annual berry programme to allow them to maximize their offerings and increase their velocity in the berry category.

For the producers and berry growers who own BerryGardens, the new company will offer growers exclusive berry varieties, the best plant material available and the best overall return for their crop. By working with growers in the production planning by berry type, growers and BerryGardens can develop an orderly marketing plan for the crop, which meets the expectations of both the market and the grower. BerryGardens will work with growers to develop berry varieties that are disease resistant, allow for profitable grower yields, and are welcomed in the market by both the customer and the consumer. Growers will also be aligned with a strong marketing organization. KGG owners will receive dividends from BerryGardens, should this company make a profit. Finally, BerryGardens and its growers will be able to share technical data and techniques related to cultural practices that can drive production, improve quality or lower costs.

### **Conclusion**

To date KGG has delivered outstanding services to its owners, the 70 or so berry farmers from the United Kingdom. Indeed, it has provided its grower-owners with preferred access to the supermarket customers, who are tough to deal with for an individual grower but essential for British growers who wish to have a future in their national market. KGG views that it delivers collective strength in the market to its owners.

Markets move on and across Europe, concentration continues in supermarket retailing. Soon, Tesco and Carrefour will seek to develop commercial partnerships with companies that can supply across several European countries and with a range of qualities (from "Good" to "Best"). KGG and its owners are endeavouring to structure

their business and to take initiatives now that will allow them to shape their own future and not, simply, to be shaped by others who may not have the interests of growers at the front of their minds.

KGG is thus a successful example of a farmers' cooperative operating in a very successful way within a mature produce retail market while also providing clear benefits to its farmer-owners. This success story may be characterized by three essential factors:

1. The company is farmer-owned and committed to the commercial well-being of its members;
2. The market share built up by KGG gives it a countervailing power in the market;
3. The company commits sufficient resources to invest in:
  - the best professional staff in the business;
  - customer and consumer understanding;
  - R&D with world class partners (renovation and innovation);
  - grower development to improve on-farm performance (e.g. benchmarking, best practice training);
  - best supply partners in the European market.

These characteristics are worth studying so as to adapt them to other specific contexts where farmers are trying to group their activities for input supplies, output marketing and other services to group members. The KGG case study should also be a reminder to policy makers that *not* all cooperatives are doomed to fail. Farmer ownership of a marketing company can work out. The characteristics of KGG's success listed above should be disseminated to stakeholders involved in farm business development.

In summary, the cooperative model is not dead. An injection of business values, relationship marketing, product development, a mission statement and a vision for the future could help moribund models of farmers' cooperative worldwide get a new kick out of life.

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# **QUALITY MANAGEMENT**



## **Expanding the quality concept to satisfy consumer demand**

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### **Abstract**

*Personal disposable income has a significant impact on the food consumers purchase, where they buy it and where they consume it. With increasing income there is a corresponding increase in the desire for more convenience, a greater variety of food and higher quality food. Quality can be conceptualized at five levels. At its most basic level, quality captures the consumers' requirement for food that is nutritious, safe to eat and true to description. The intrinsic quality considers the physical attributes of the product. Extrinsic quality considers the value that the brand, the package, the place of purchase and the price add to the product. As attributes such as taste, texture and flavour can only be ascertained after purchase, such are described as the experiential quality attributes. The credence attributes are those that consider how the food was produced. With rising income, consumers want to know where the food was produced, what it contains and how it was produced. Concern for the environment, sustainable production and worker welfare and animal welfare are expected to become more influential in consumer decisions to purchase as they become more affluent.*

### **Introduction**

Personal disposable income has a significant impact on the food consumers purchase, where they buy it and where they consume it. With rising income comes a greater desire for more variety, more expensive and higher value foods in the diet (OECD–FAO, 2005). In general, as income increases, there is an increase in the consumption of meat, sugar, vegetable oils and dairy products and a parallel decrease in the consumption of roots and tubers, cereals and coarse grains. These changing consumption patterns tend to accelerate as the population becomes increasingly urbanized.

Rapid urbanization has also contributed to changes in lifestyles and food preferences (OECD–FAO, 2005). As their purchasing power has grown, city dwellers have increased their demand not only for more dietary diversity, but also for more convenient products that require less time to prepare and to consume. Hughes (1999) demonstrates how, since 1934, food preparation time in the home has declined from 2.5 hours to 15 minutes (in 1994), and by 2010, it is expected to decline to eight minutes. This implies substantial growth in the market for prepared and semiprepared food and increasing expenditure on food away from the home. In this respect, convenience is also associated with eating “on the run”; products that do not make a mess; and products that can be eaten in one hand (Martech, 2005). Parallel with the desire for greater convenience is an increase in more trendy sophisticated foods, as well as snacking, cafés and 24-hour food sales.

Food is sold either through retail stores or food service establishments. While over 40 percent of the total value of global food sales is currently made through the food service sector, sales through the food service sector are expected to overtake retail food sales in the immediate future (Gehlhar and Regmi, 2005). Furthermore, at the retail level, food can be broken down into two broad categories: fresh and processed. Packaged food already accounts for more than half of total food expenditure in the industrialized countries, but a third or less in the developing countries.

With increasing income and the desire for greater convenience, a greater quantity of food is purchased from supermarkets. Supermarkets are perceived to be cleaner and more hygienic, and the extended shopping hours provide greater opportunity for time-constrained consumers to purchase. Research indicates that most consumers visit a supermarket at least twice a week, with most shopping during the weekend (79 percent) (Glover, 1999). For those buying during the week, most shop between 16.00 and 21.30.

Product diversity is also increasing as producers, food manufacturers and retailers strive to meet the demands of increasingly sophisticated consumers (Martech, 2005). Products are being differentiated on the basis of what they contain and or what they do not contain (Centrec, 1999). Some attributes are based on the methods of production, the place of production, the way in which the product has been processed or handled, and the impact that either the production or processing of the product has had on the environment and society. With such an increasing array of products, supermarkets provide an opportunity for consumers to interact with the product with no obligation to buy (Irving, 1999).

While there is an implicit assumption that food is safe to eat, with the increasing reliance on convenience foods and greater consumption of food away from the home, the incidence of food poisoning is increasing, even in the world's most developed economies. Centralized food processing and mass catering provide greater opportunities for food to become contaminated from a wider range of pathogens (Kaferstein, 2003). More intensive animal production systems potentially encourage the spread of zoonotic micro-organisms. Moreover, the food safety problem is rapidly becoming a global problem because of the increasing international trade in food and animal feed. Tourism may also contribute to the increasing spread of food-borne disease, for people can acquire an infection in one part of the world and spread the causative agent in another.

Studies of food and culture indicate that the taste for raw food is based on the belief that such food is healthy and invigorating (Kaferstein, 2003). However, such food is not always safe to consume. With increasing affluence, the consumption of "blue" steak, sashimi and raw shellfish increase, thereby exposing consumers to considerable risk. Furthermore, consumers are demanding foods that are minimally processed, without the use of preservatives. The prolonged storage of such foods can result in the growth of pathogens, even at refrigeration temperatures, thus increasing the risk of disease. With more consumers relying upon processed food and with more meals being consumed away from the home, a lack of education in the basic rules for the hygienic preparation of food is a major factor contributing to the increasing incidence of food-borne disease in the home. Finally, as the population ages, a larger sector of the population has a lower resistance to disease and is therefore more vulnerable to food-borne illness.

Not only must the food be safe to eat, but as income increases, consumers expect their food to be produced and processed in a manner that is safe for the environment. While such issues as chemical residues, soil erosion and contamination of water resources predominate, in the world's most discerning markets, animal welfare, biodiversity, ecoefficiency, fair trade and social accountability are growing in importance (Baines, 2002; van Berkel, 2002).

It is also important to appreciate that as income increases, expenditure on food, as a proportion of the household budget, decreases (Gehlhar and Regmi, 2005). During the last decade, consumers in the high income countries spent an average of 13 percent of their total household income on food, whereas consumers in the low income countries spent an average of 43 percent. As there is a limit to how much food an individual can consume, with increasing disposable income, the demand for food is driven by an increasing desire for higher quality products. Hughes (1999) describes how leisure shoppers are purchasing for an important meal or social occasion and are much less concerned about price. The product taste and provenance of the food become much more important. Purchasing more exotic food from faraway places is part of the romance of leisure shopping.

### **Defining the quality concept in the fresh produce sector**

Quality is the key concept in building customer value and satisfaction (Oude Ophuis and van Tripp, 1995). However, quality is a multifaceted concept which is defined in many different ways.

From the utilitarian perspective, Peri (2006) defines quality as fitness for consumption. Quality can thus be described as the requirements necessary to satisfy the needs and expectations of the consumer. To some, quality is considered synonymous with innate excellence which cannot be analysed, but only recognised through experience (Oude Ophuis and van Tripp, 1995). At the other extreme, quality refers to some measurable comparison to some predetermined or ideal standard. However, as quality means different things to different people, quality is best evaluated at an individual level. Aaker (1991) defines perceived quality as the customer's perception of the overall quality or superiority of the product with respect to its intended purpose, relative to the alternatives. Perceived quality is therefore, an intangible, overall feeling about the product, which is usually based on some underlying dimensions including such variables as product reliability and performance.

Even so, quality is a multifaceted concept, based on several dimensions that cannot all be evaluated by the consumer prior to purchase (Oude Ophuis and van Tripp, 1995). Consumers therefore must use surrogate or indirect indicators of quality to make a judgement of perceived product quality from an array of product-related attributes. These quality cues may be categorized as either intrinsic or extrinsic. Intrinsic cues are part of the physical product. Extrinsic cues, although related to the product, are not physically part of it. A further distinction is made between experience quality attributes and credence quality attributes. Experience attributes can be ascertained on the basis of actual experience whereas credence attributes cannot.

### **Intrinsic quality**

Intrinsic quality attributes are closely related to the product and cannot be changed without also changing the physical characteristics of the product (Oude Ophuis and van Tripp, 1995). Appearance, colour, size and shape often serve as intrinsic quality indicators for fresh fruit. The Horticulture Research and Development Corporation identified freshness, firmness, colour, variety and size as the most important attributes that helped consumers select fruit (HRDC, 1990).

### **Extrinsic quality**

Price is the most well known extrinsic indicator of quality (Oude Ophuis and van Tripp, 1995). When no other information is available and the consumer must judge the quality of two similar products, the higher-priced alternative is generally expected to deliver superior quality. However, there is also evidence to suggest that most consumers rate quality as being more important than price (Batt and Sadler, 1998).

For the majority of consumers, quality means recognizable brands (Glover, 1999). Much of the value of a brand is determined by the quality of the product that the brand purports to deliver to consumers (Aaker, 1996). While this is most often associated with the tangible product features, as consumer incomes increase, consumers' wants expand to incorporate a greater variety of both intangible and credence attributes. The product must not only look appealing, but it must also deliver the desired taste and it must have been produced in a manner that minimizes the impact on the environment.

For the majority of horticultural products, branding means identifying the product with a label (Pay *et al.*, 1995). Bowbrick (1992) suggests that a label attached to products from a specific producer, distributor or retailer aims to convey information to or to persuade a potential customer about the quality, reliability, social status, value for money or safety of the product. Perceived quality, associations and a well-known name may not only provide reasons to purchase and affect use satisfaction, but may also have the potential to provide significant price premiums for producers (Aaker, 1991).

While the use of brands, particularly generic in-store brands, is rapidly increasing in the retail sector (Fearne and Hughes, 1999), branding fresh produce remains problematic. In Australia, most growers are labelling apples, irrespective of the quality, resulting in mixed grades and no guarantee of delivering premium quality (Batt and Sadler, 1999). However, other variables are involved. The product is perishable, thus irrespective of quality at the time of branding the product will deteriorate because of inappropriate post-harvest treatments or poor product handling. With each grower having his or her own perception of quality, fruit of vastly different quality standards will emerge on the retail shelf, so even if individual growers do differentiate between grades, quality differences will be lost at the retail level.

In what is rapidly becoming a global food market, the most widely used means of branding fresh produce is country of origin. Consumers differentiate between products from different countries on the basis of product-country images. These images, which may be based on actual product experience or information gathered through advertising and other sources of market information, provide consumers with a basis for evaluating perceived product quality (Verlegh *et al.*, 2005).

Country of origin is believed to influence consumer product evaluations most when the consumer's level of involvement in the purchase decision is low (Verlegh *et al.*, 2005). As the purchase of food is most often considered to be a routine, low involvement decision, consumers can be expected to place considerable importance on the country of origin. However, before producers seek to benefit from the country-of-origin effect, some consideration must be given towards the perception, favourable or unfavourable, that consumers may already hold. Not only is the country-of-origin effect product-specific, but it is to a large extent, uncontrollable. Negative publicity and unrelated low quality products from the same country of origin can seriously damage the brand or an unrelated product. Especially where attempts are made to differentiate the product in the market on the basis of some intangible or credence attribute, consumers may seriously question whether the country of origin has the capability to deliver what is promised.

Increasingly, consumers want to know that their food is safe, where it came from, how it was produced and who handled it (Martech, 2005). Proof of claims is becoming a key requirement, especially with regard to the health benefits and the various credence attributes such as how the product was produced (organic, hydroponic), the means by which it was processed (*halal*), the environmental quality (conservation, sustainability), or social equity (worker welfare, child labour, fair trade). Labelling is also required to provide nutritional information and to identify what components have been added to the food, including the presence of genetically modified organisms (GMOs).

The product packaging system must facilitate product recognition, marketing and use (Peri, 2006). The quality associated with packaging will include aesthetic requirements concerning its presentation and the information conveyed by the label. Ease of use has become a decisive factor, whether it concerns the transportation, conservation, preparation or use of the product.

### **Experiential quality**

For food, taste is the most important experience attribute (Oude Ophuis and van Tripp, 1995). While the interaction of several intrinsic and extrinsic quality cues with taste and flavour has been documented, Batt and Sadler (1999) suggest that the physical attributes most often used by consumers to select fresh fruit from a retail store are poor indicators of eating quality.

In most instances, the consumer preference for fruit is derived from the interaction between taste, texture and flavour (Harker, 2001). Texture relates to the mechanical properties of the flesh, mouth-feel and juiciness. However, Codron *et al.* (2005) consider that appearance should also be considered as a sensory attribute, for there is anecdotal evidence to suggest that most "consumers eat with their eyes" (Hughes, 1999). Peri (2006) further expands on the sensory attributes to include memory, culture, values and emotions, for these bring together the consumer's knowledge or memory of food and the consumer's sensory reactions to it.

### **Credence quality**

The credence attributes are desirable product benefits like nutritional value and wholesomeness that cannot be experienced directly (Oude Ophuis and van Tripp, 1995). To assess the credence attributes, consumers must rely on the judgement or information

of others that the product contains the desired attribute. Health is a typical credence quality attribute that is becoming more important as consumers' disposable income increases. While most consumers are aware of the link between eating and health, they do not expect the consumption of a product on a single occasion to have a health implication that they can experience (Codron *et al.*, 2005). Nevertheless, most consumers are aware of the adverse implications of regularly consuming foods high in fats, sugar and salt, and there is growing evidence of the consumers desire to avoid those foods containing preservatives, artificial colours and flavours (Batt *et al.*, 2006).

There is however an implicit assumption that the food that reaches the supermarket shelves is safe to eat (Codron *et al.*, 2005). Following an alarming increase in the incidence of food poisoning, most governments have responded by enacting a raft of legislation which requires retail buyers to take all reasonable steps to ensure that the food they sell is safe (Wilson, 1996). As a result, most major supermarkets now require fresh produce to come from suppliers who have an appropriate accredited quality management system. A genuine and visible quality management programme is a prerequisite for any fresh produce company which wishes to supply the supermarkets (Fearne and Hughes, 1999).

The increasing desire for safe food not only encourages consumers to purchase more familiar brands and prepackaged products (McCann-Hiltz, 2004), but for them to take a greater interest in the holistic characteristics of the food that they purchase (Batt *et al.*, 2006). Environmental values are becoming increasingly aligned with a greater suspicion of industrial food processes and the desire to support environmentally sustainable farming practices.

With regard to the environmental impacts, Martech (2005) differentiate between the "eco-impact" and the "eco-image". The eco-impact considers the contamination of soil and water resources with the consequent loss of fitness for both current and future uses. The eco-image is influenced by the consumer's value system and includes such issues as animal welfare and responsible consumption. This includes recycling, sustainable production practices, a perception that natural is better (non-GMO) and a sense that native flora and fauna need to be protected. Furthermore, the need to recognize and protect indigenous culture and values is increasing in importance.

In Australia, most consumers show little concern towards the possible presence of chemical residues because most consumers wash the fresh fruit and vegetables they have purchased prior to consumption (Batt and Giblett, 1999). However, there is also an implicit assumption that under the various quality management systems that most modern supermarkets operate, growers have adhered to the prescribed withholding periods and applied chemicals at the appropriate rates. Within many of the transitional economies, given the chemicals currently available, the growers' lack of knowledge and the high incidence of pests and disease, such assumptions are ill-founded. Anecdotal evidence from Kapatagan (a *barangay* on the slopes of Mount Apo in Southern Mindanao), suggests that farmers seldom eat the vegetables they have grown because of the high quantities of chemicals applied (Batt, 2004). Some consumers reportedly look for produce which has been eaten by insects on the grounds that these are indicators that the produce had not been sprayed excessively. However, freedom from chemical



residues is seldom an issue unless consumers are prompted. As a latent variable, freedom from chemical residues will only become an issue when visible residues are present on the produce, thus bringing it to the consumer's attention or when consumers demonstrate an express desire for organically grown produce.

It is also important to realize that food carries symbolic meanings and has psychological significance beyond its nutritional value (Sijtsema *et al.*, 2002). Not only do certain products have different meanings for different religions, but the amount and the time at which food is consumed can have meaning. Religious norms often specify what food may be consumed and which is forbidden.

Food preference constitutes one of the strongest single predictors of food choice and preference. Food ideology is a combination of attitudes, beliefs, customs and taboos affecting the diet of a given group (Fieldhouse, 1995). Food habits evolve from learned experience, which in turn leads to the development of attitudes. Food binds people to their faiths through powerful links between food and memory, which both solidifies group membership and sets groups apart. Personal ideology may also incorporate many political beliefs and concerns that individuals may possess (Pollard *et al.*, 2002).

### **Conclusions and implications**

Consumers' assessments of fresh fruit and vegetable quality vary considerably according to country, sex, age, socioeconomic status and other factors (Shepherd, 2006). Nevertheless, criteria such as appearance, colour, uniformity, ripeness and freshness are invariably the major variables that influence the consumer's decision to purchase. While other quality criteria such as flavour, aroma and texture cannot be assessed prior to purchase, consumers base their purchase decisions on previous experience.

In some cases it may be possible to judge the internal quality from external appearance. By looking at fruit, for example, it may be possible to tell whether it is ripe or unripe and, therefore, whether it is sweet or sour. Where consumers are permitted to touch fruit, the intrinsic quality can be assessed by smell, the degree of hardness and even sound, but repeatedly touching the fruit can also have a negative impact on quality. However, it is rarely possible for consumers to identify that produce which may be unsafe when it is on retail display.

For those consumers who are concerned about food safety and can afford to do something about it, they may choose to purchase from supermarkets (Shepherd, 2006). Others may purposefully select preferred brands, preferred varieties or select produce on the basis of the country in which it was produced. While the majority of the consumer concern is directed towards the dangers arising from pesticide residues, most consumers are completely unaware of the potential threat of microbial and parasitic contamination. Most consumers erroneously believe that produce that is fresh, clean and packed is also safe to eat.

However, for the majority of low income consumers, price is the dominant factor in the decision to purchase. Despite the inherent risks, many consumers are unable to pay

more for safer produce and must buy whatever is available in the market. Furthermore, store location and convenience may be more important than quality (Shepherd, 2006). In such circumstances, consumers purchase fruits and vegetables at prices they can afford and, at those prices, make purchase decisions on the basis of intrinsic quality criteria. Food safety does not appear to play a vital role in the consumer's choice, except among the higher income groups.

Even among the higher income groups, while consumers may be interested in all four types of quality attributes, many believe them to be, at least partly, incompatible. For example, the high fat content in a dairy product may be regarded as an indicator of both superior taste and inferior health (Codron *et al.*, 2005). Organic products may be desired as a form of production but at the same time be perceived as being less healthy by some consumers because of the application of animal manures. Convenience products with a high degree of processing may be regarded as undesirable in terms of their industrial methods of production and yet without minimal processing, many fruits such as oranges, mangoes and pineapples present major problems for consumers. While fresh fruit and vegetables make for healthy living, many consumers believe more health-giving vitamins can be obtained in a tablet and that tomato sauce has more antioxidants than fresh tomatoes (Hughes, 1999).

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## **“Executive Flower Management”, a unique quality performance management concept to regain trust and satisfaction of global flower consumers**

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### **Abstract**

*The floricultural world is changing fast. Southern global areas are producing for northern global markets. National production-driven supply chains are converting to closed international market-driven supply chains. Product flows are increasingly decoupled from information and sales flows. More information in the supply chain is known and decisions have to be made in shorter time. Often, the only market information a producer receives are client orders, but these are subject to rapid changes, especially in the flower sector where weather conditions can have a huge impact on customer demands. Uncertainty leads to inefficient processing and non-value adding activities. Distances between production, the market place and final consumers are still increasing, so logistical performance becomes more important but seldom meets its objectives. For this reason, there is an increasing interest in optimization of chain performance to prevent inefficiencies and quality losses. “Executive Flower Management” is a concept developed continuously to monitor the gap between actual measured and wanted target product and process key performance indicators in flower supply chains. These key performance indicators are based on plant physiological and managerial standards. Early observation of unacceptable differences between actual and target performance can result in early and efficient managerial actions. This all leads to more reliable performance which enables producers to serve final customers better with high-quality flowers.*

### **Global floricultural production and trade: a dynamic environment**

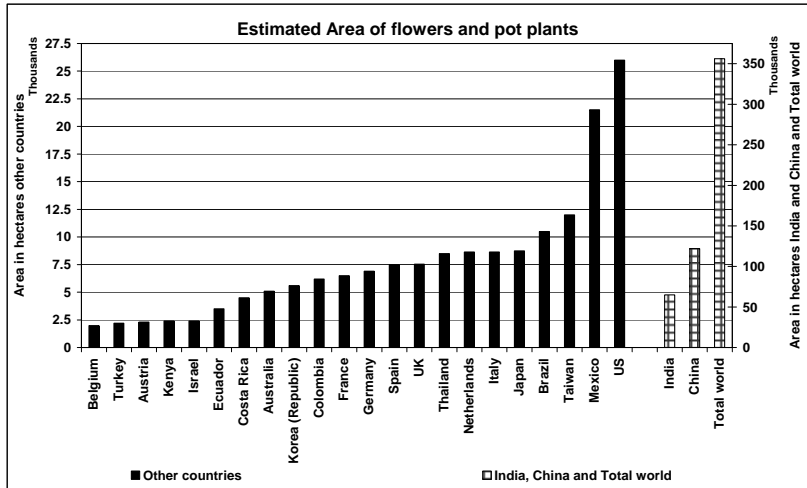
The horticultural world is very dynamic and rapidly changing. The distance between production, the market and the final consumer is still increasing: southern parts of the globe are producing for northern markets.

#### **Global floricultural production**

Figure 1 shows the worldwide production area in countries with more than 1 500 ha devoted to flowers. Global production is put in black bars and shown on the left axis. The People’s Republic of China (122 600 ha) and India (65 000 ha) have the majority of the land area devoted to cut flower and pot plant production. However, we can consider much of this area as non-professional production: in the People’s Republic of China and India, production takes place on a very small scale (0.5 ha per family), and sales and consumption are within the same region and do not play any role in the international ornamental plant trade. We must also mention that the data is not completely reliable,

since it may be influenced by errors in invoicing systems and incomplete statistics provided by the countries.

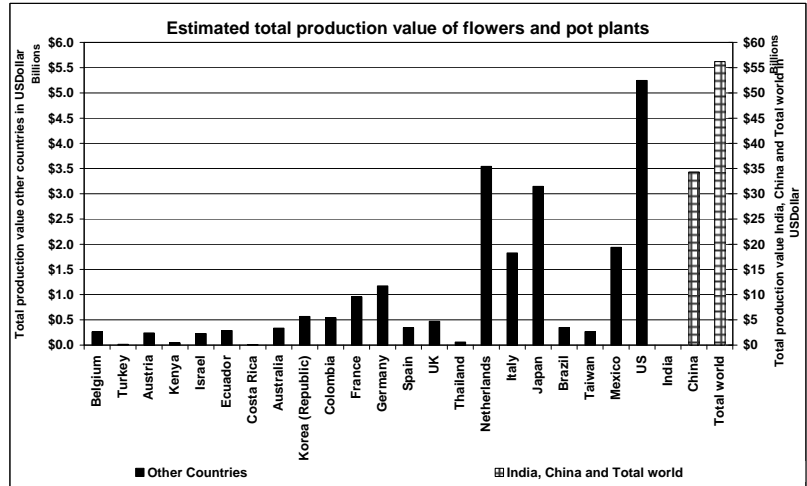
**Figure 1: Estimated area (ha) of flowers and pot plants**



Source: Wijnands (2005) and AIPH (2004)

Another angle from which to look at the world flower business is the production value (Figure 2).

**Figure 2: Estimated production value of flowers and pot plants**



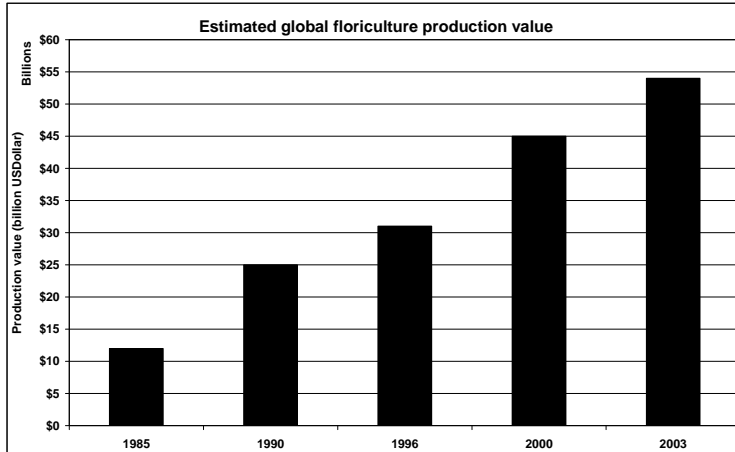
Source: Wijnands (2005) and AIPH (2004)

Unfortunately, the available statistics are not reliable for Mexico, Costa Rica or Ecuador. The production value for these three countries has been estimated by multiplying the area by the production value per ha in Colombia. The production value for the People’s Republic of China (€34.3 billion) is far larger than that of the United States of America, and data for India is not available. The differences in total production value can be explained by differences in the production value per hectare (Wijnands, 2005).

**Global floricultural consumption**

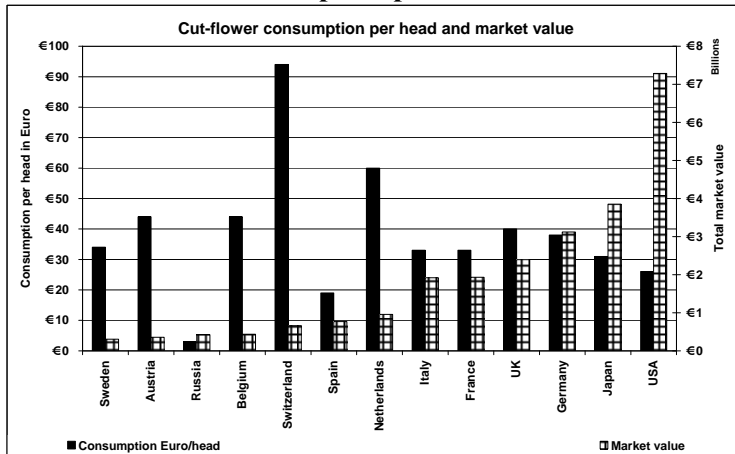
The production value has steadily increased over years, as shown in Figure 3. The total market for cut flowers in a country depends on the average consumption per capita and the number of inhabitants. The annual consumption per head ranges from a few euros in Russia to €90 per year in Switzerland. The market value is high in the United States of America, Japan, Germany and the United Kingdom, depending more on the number of inhabitants than consumption per capita, which is shown in Figure 4 (de Groot, 2004; Wijnands, 2005). Aiming at these high-value markets is the challenge for flower-exporting countries.

**Figure 3: Estimated global floriculture production value**



Source: De Groot (2004)

**Figure 4: Cut-flower consumption per head and total market value**



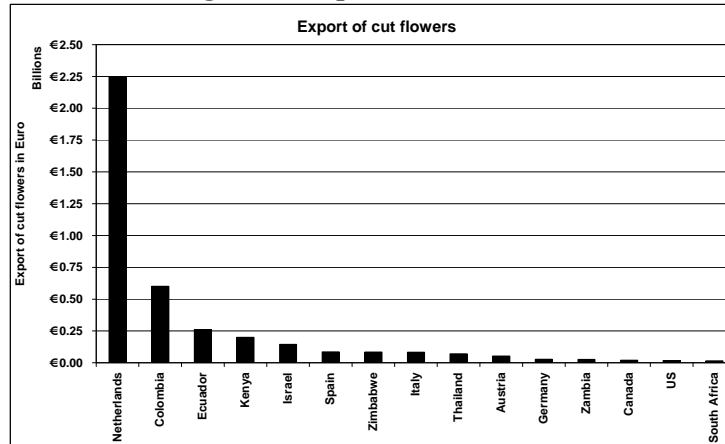
Source: Wijnands (2005) and AIPH (2004)

**Global floricultural trade**

Worldwide, there are three main flower consumption centres: the United States of America, Japan and Europe. Domestic floricultural production is the main source, but the quantity of imports is increasing. The United States of America is mainly supplied by Colombia and Ecuador. In Europe, the Netherlands is the dominant supplier, but domestic production is combined with imported product, mainly from Africa.

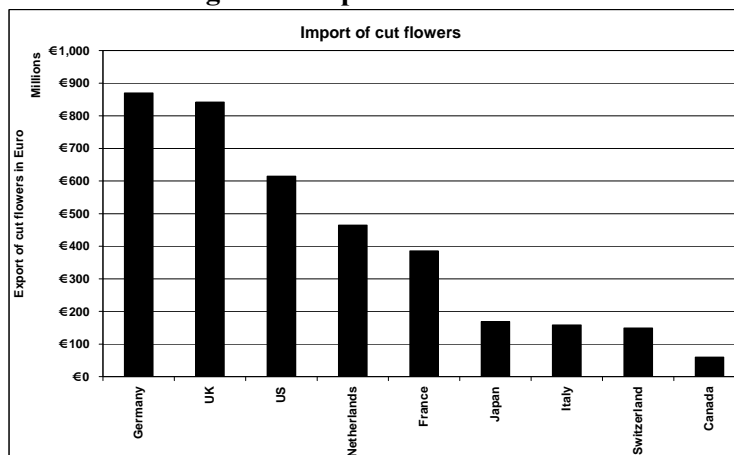
Nowadays, production alone is not enough to be part of global commodity chains. International trade flows are of more importance. Figure 5 shows the exports of cut flowers from the major exporting countries. The Netherlands continues to hold the dominant position with around 45 percent of the world trade in 2002. Colombia, the second largest exporting country, has a share of 12 percent and Ecuador about 5 percent. The main flower importers are the developed countries (Figure 6). In these statistics, no figures from Eastern Europe are mentioned, due to limited and unreliable data. However, this market is thought to be worth €500 million.

**Figure 5: Export of cut flowers**



Source: Wijnands (2005) and AIPH (2004)

**Figure 6: Import of cut flowers**



Source: Wijnands (2005) and AIPH (2004)

In some developed countries, flower sales are dominated by flower shops and in others by supermarket chains. In the United Kingdom and the United States of America, the supermarkets have the largest share, whereas in Germany, the specialist florist shop is the major outlet (Wijnands, 2005).

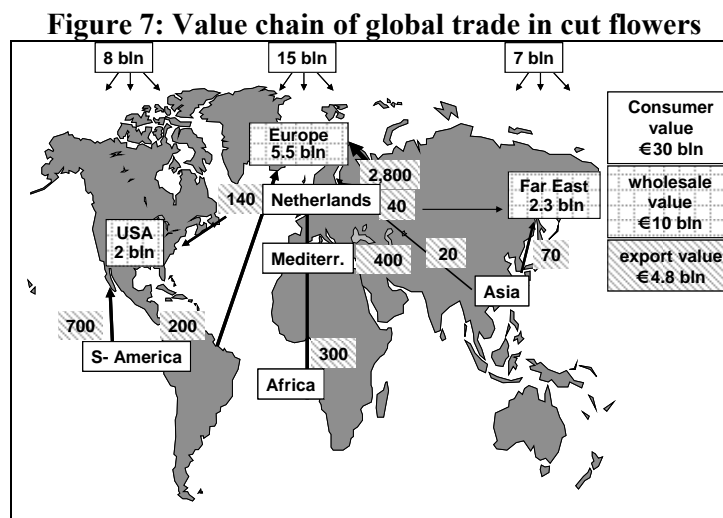
Figure 7 shows that the total export value of the global trade in cut flowers is estimated at €4.8 billion. One step downstream in the supply chain towards final customers, this



value increases to €10 billion globally. At the final consumer market, the value has increased to €30 billion. The conclusion is that the value chain for cut flowers multiplies about six times from production towards the final consumer.

### Global floricultural business trends

Generally speaking, there are more producers than buyers for floricultural products. Flower growers compete with each other to become the preferred supplier for particular buyers. Each grower tries to be recognizable in the market by means of product availability and quality, for example by delivery at the right moment with extra services. Most of the time, buyers can choose from a set of growers all offering the same product and they choose the quality–price combination which is most favorable for them. Combined with so called “soft” factors such as grower’s reliability, track record and relationships, this will result in a certain market price which the grower can expect based on total global supply and total global demand.



Source: Rikken and Botden (2006)

### Trends in changing flower supply chains

In the global cut flower business, trends such as the increase in production volume, product quality, diversity and availability, up-scaling, cost reduction activities and horizontal and vertical chain integration can be observed each day (Rabobank, 2002).

Supermarkets and garden centres are expected to increase their market shares. The concentration on the demand side will have major impacts on the marketing system (Wijnands, 2005). It is expected that the open and transparent market like, for example the Dutch flower auctions, will step-by-step be replaced by more closed market chains. The network structure of supply and demand will be replaced by closed supplier-buyer relationships. Moreover, whereas the open market is mainly driven by supply, these closed market chains will be driven by demand (Botden, 2006; Rabobank, 2002).

Since flowers are products of Mother Nature, flower production can be irregular and difficult to forecast. Flower consumption can also be irregular and is influenced by the

weather, seasonal patterns and the presence of personal or religious celebration days. Consumption is hard to forecast. Moreover, supply chains that transport perishables from producers to consumers are not always reliable. When this irregular production, consumption and supply chain performance are combined, a very complex market emerges where the value of reliable information is very high.

The turbulent, uncertain and highly competitive global floricultural environment forces links in the flower supply chain (FSC) to be more efficient and effective. This results most of the time in a redesign of the FSC. Some major factors behind this are:

**Market structure:** There is a worldwide reduction of trade barriers and development of regional, supranational economic zones (globalization).

**Increase of decision-making uncertainty:** Changes in markets, products, technology, and competitors are occurring at an increasingly rapid speed. As a result, decisions must be made in less time, with less information and with higher penalty costs.

**The need to redesign flower supply chains:** The keys to long-term competitive advantage in today's market are flexibility and rapid customer response. To maximize a competitive advantage, all members in a FSC should work seamlessly together to serve the final customer. The knowledge that other actors in the FSC can damage all the efforts taken to preserve high product quality leads to a thorough understanding of the necessity to perform well as a total FSC.

By creating a responsive customer-driven FSC, profitability can improve drastically (Rabobank, 2002; van der Vorst, 2000; Chainge, 2002). Customers wish more and more for value to be added to the floricultural products they buy. To serve these consumers, companies have to work together. There is a need for transparency in the chain to make value-adding processes profitable and effective. As not all companies and chains will achieve this transparency, two groups of companies will emerge in the international flower market:

**Product-providers:** Companies that are incapable of acting flexibly will continue to trade huge amounts of flowers with low added value with many customers and chains. Margins will be low but so will the transaction costs.

**Value-providers:** The cost price of the product will be lower as a result of more effective processes in the chain. This is possible because chains are transparent and companies are working closely together to serve the consumer. This lower cost price is reinvested in service and will lead to more direct sales in fixed chains and more long-term profits (Rabobank, 2002; Botden, 2002).

### **Trends in process and product quality demand**

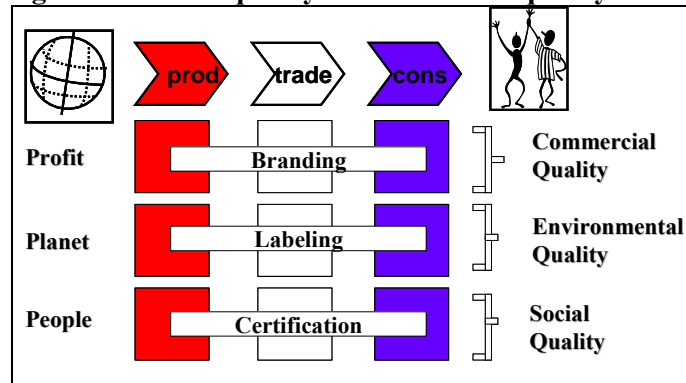
Worldwide, social opinions are changing. Society demands from companies active in the horticultural sector that they be socially responsible. The impact and speed of these changes is accelerating and leads to strategy changes by producers of flowers or companies active in the chain, in order to reach the flower-buying consumer. When current strategies cannot be changed, this may lead to a loss of the connection with society and the market. All links in a flower supply chain must be aware of this social

responsibility, because the performance of the chain is based on the performance of the individual links (Rabobank, 2002).

For consumers, exclusivity, freedom of choice and good experience with a product are still the main factors when buying flowers. Environmentally friendly production, vase life and convenience are becoming more important. To guarantee these aspects, traceability and certification are becoming more popular. Product responsibility is increasing and adding value to products will be more important in the future. Transparency of the whole chain is more important and will lead to more close cooperation between companies.

In the past, flower quality was mostly defined by product quality. However, these days, flower quality is defined more by process quality. Flower buyers demand that producers respect the environment, the workers (health care, safe working conditions), that they comply with the demands made by the retail sector (profit) and that this is all regularly checked (labelling, certification). Performing well on environmental quality levels and social quality levels will give a licence to perform on commercial quality levels. This is shown in Figure 8.

**Figure 8: Flower quality as a result of 3 quality factors**



Source: De Boon (2003)

We define flower quality as the extent to which the buyers' expectations before purchase are met or exceeded by their experience postpurchase. In the past, this flower quality was mostly defined by product quality. Product quality is created until the moment of harvest. After harvest, everything should be done to maintain this initial product quality or to minimize any decrease in quality. When the distance to the market is large, even more attention should be paid to quality aspects in order to compete with other suppliers in the market.

The main quality problems in cut flowers which can occur in post-harvest phases, are: heterogeneous maturity, mechanical damage, fungal infections, bacterial growth, problems with flower opening, wilting and overheating during transport (Botden, 2002; Terhürne, 2004; van Houtte, 2000).

### **The need for optimized redesign of flower supply chains**

The keys to long-term competitive advantage in today's market are flexibility and rapid customer response. To maximize a competitive advantage, all members of a flower supply chain should work seamlessly together to serve the final customer. Unfortunately, most flower supply chains are not performing at their optimum levels so customers' experiences often fail to meet their expectations. It is estimated, for example, that 30 percent of the flowers harvested in Africa are lost in the supply chain before reaching the final customer.

In the United States of America, it is reported that, despite a substantial increase in total sales of flowers over the past four decades and a considerable reduction in real retail prices, per capita consumption of cut flowers is low compared to that in other major markets. This may be explained partly by differences in lifestyle and culture, but a major component of the low sales of cut flowers in the United States of America is customer dissatisfaction with quality, particularly vase life. Poor vase life is the result of long transportation times, excessive storage and poor temperature management in the supply chain (Reid, 2005). American customers don't complain; they simply choose substitutes for flowers when they are not satisfied. The result of this trend is that 80 percent of flower sales and profit is concentrated around some special events like Valentine's Day (van Kooten, 2006).

A similar trend to the one described for the United States of America is visible in Europe also. Only by rebuilding customer satisfaction can trust be regained. This is only possible by optimization of the sector where customer demand is the central issue and sustainable linkages are built between the producers and consumers of flowers (Botden, 2005).

To rebuild customers' confidence, the whole supply chain must cooperate, preferably through both horizontal and vertical chain integration. When trust in the product is restored, customers will be willing to pay more for the same product when combined with higher levels of service and convenience (van Kooten, 2006).

#### **“Executive Flower Management”: a concept to regain trust and satisfaction**

Today, markets ask for transparency in information concerning production, post-harvest and logistical performance, in order to decrease uncertainty. This enables buyers to provide their downstream customers with the highest achievable product quality and service and ultimately to fulfill the final flower-buying consumers' expectations. However, product and process quality often fails to meet its objectives, leading to distrust and dissatisfaction. This situation has led to the development of a unique quality performance management system, called Executive Flower Management (EFM) which is a joint activity between two Dutch companies, Florence Creations BV and HortiSolutions BV.

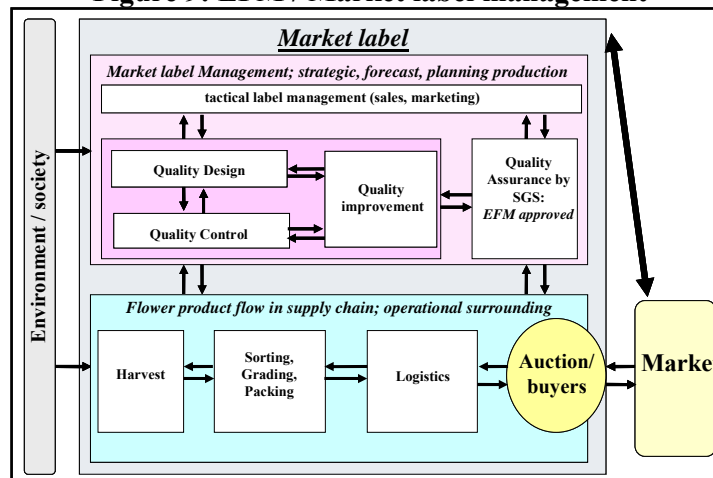
#### **EFM**

EFM is an SGS-certified quality management system. EFM enables growers to strengthen their market position by meeting product and process performance

expectations more reliably. EFM is a concept developed to monitor continuously the gap between actual measured and desired farm individual or group target performances in product and process key performance indicators. These key performance indicators are based on plant physiological and managerial standards. Early observation of unacceptable differences between actual and target performance allows efficient managerial actions to be taken to improve performance. This leads to more reliable performance which enables the whole supply chain to serve final customers better (Figure 9).

EFM shows the performance of each company on a daily basis by monitoring a large set of key performance indicators. This enables each individual company to move towards company-specific or agreed group standards. EFM will provide reliable, independent information about the flowers at point of sale, in order to monitor the performance of the total supply chain.

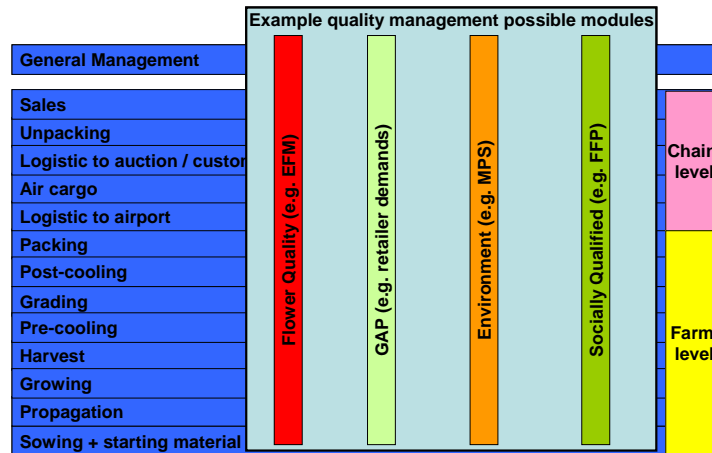
**Figure 9: EFM / Market label management**



**EFM quality design**

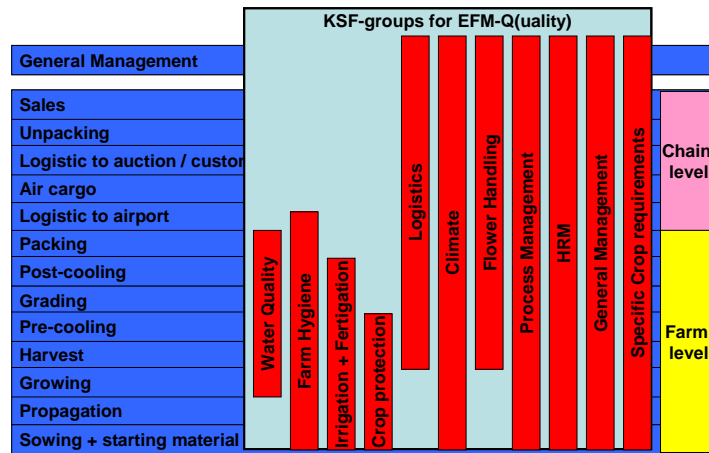
Flower quality is a combination of environmental, social and commercial quality performance. As it is almost impossible to improve every quality aspect at once, EFM specializes on the commercial quality aspects and focuses on the specific product and process factors which directly influence the post-harvest quality of flowers. For environmental and social aspects, there are other systems already available (Figure 10).

Figure 10: Example quality management modules



EFM formulated standards for product and process quality, together with growers. Based on scientific knowledge, key performance indicators (KPI) were developed. As several KPIs belong together, these were grouped to form key success factors (KSF). These KSFs focus on different parts of the supply chain from the field until the final auction clock if applicable (Figure 11).

Figure 11: EFM-Q(uality) KSF-configuration



The total set (about 160 KPI) for product and process quality is spread over four EFM implementation phases, where EFM-Q phase 1 is a small set to start with. When a farm successfully implements these standards, a next set can be added. A snapshot of the total list is shown in Figure 12.

Figure 12: Snapshot of Process Quality KPI parameters

vol g nr	KPI Ident				TQM Level				Criteria						
	Use	Department	KSF	KPI nr	TQM Phase 1	TQM Phase 2	TQM Phase 3	TQM Phase 4	Criteria	Method	1: Bad	2: Moderate	3: Average	4: Good	5: Excellent
31		04: Harvest	01: Water Quality	12	x	x	x	x	Use of chlorine in harvestbuckets	Check status of this rule	no		sometimes		always
32		04: Harvest	01: Water Quality	13			x	x	Dose of chlorine in harvest bucket or harvestwagon (concentration chlorine)	Measure concentration of the chlorine	No (0 ppm) or too much chlorine (120 ppm)	Hardly any chlorine (0 - 4 ppm)	Little chlorine (4 - 12 ppm)	Sufficient amount of chlorine (12 - 40 ppm) or (100 - 120 ppm)	Good amount of chlorine (40-100 ppm)
33		04: Harvest	01: Water Quality	14		x	x	x	When chlorine in the harvest bucket, pH of the water in the harvest bucket	Measure pH of the water in the harvest bucket?	> 7 of < 4,5	6,5 - 7	6 - 6,5	5,5 - 6	4,5 - 5,5
34		04: Harvest	01: Water Quality	15	x	x	x	x	Loose leaves are taken out of the water	Check status of this rule	no		sometimes		always
35		04: Harvest	02: Farm Hygiene	01					Frequency of cleaning harvest tools such as knives	Check status of this rule	< 1x / 2 weeks	1x / 2 weeks	1 x / week	2x / week	1x / day
36		04: Harvest	02: Farm Hygiene	02	x	x	x		Cleaning harvest tools such as knives with desinfectant	Check status of this rule	< 1x / 2 weeks	1x / 2 weeks	1 x / week	2x / week	1x / day
37		04: Harvest	05: Logistics	01			x	x	Time between filling of harvest buckets with water and filling with flowers	Average lead time of three harvest buckets from moment of water filling and moment that flowers are put in	> 60 min	< 60 min	< 45 min	< 30 min	< 20 min

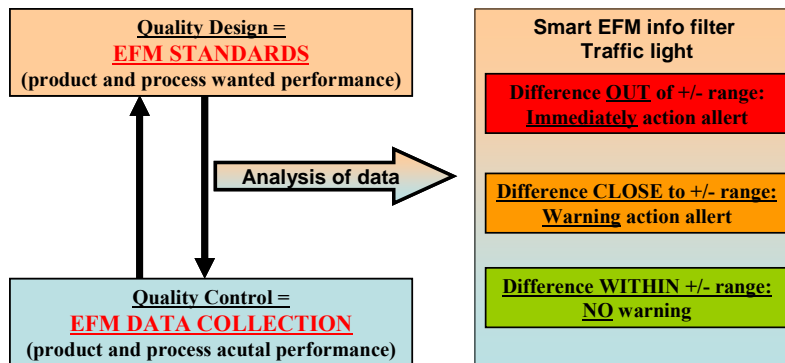
**EFM quality control**

The KPIs for product and process quality are measured with different frequencies. Some are quantitative (for example, temperature) whereas others are qualitative (source of water). The EFM quality control procedures go along with EFM manuals which describe how to measure actual performance of an EFM parameter and why this KPI parameter is important. Measured values are submitted in Microsoft Excel format to EFM management for further processing and analysis.

**EFM continuously monitoring and improving ICT infrastructure**

The current trend in floriculture is for farm or chain managers to get more and more information each day through improved ICT. It is important that the huge amount of information is filtered, and that only information which is not within the range of set standards is communicated. EFM is realizing this by an online internet-based analysis of the differences between actual values and the KPI standard. In general, this works like a funnel and a traffic light (Figure 13):

Figure 13: Configuration of smart internet-based total quality management information filter



- **Green.** KPI performance is within standard range. Information is not going through the smart EFM filter and is not reaching the manager.
- **Orange:** KPI performance is within standard range, but reaching boundaries. Information goes through the smart EFM filter and reaches the manager as a “warning”.
- **Red:** KPI performance is out of range. Information goes through the smart EFM filter and reaches the manager as an “alarm”.

The result is an online management tool which generates management information based on the actual performance of the company. EFM is currently serving two Dutch rose brand labels, Dutch United and Florence, which produce 200 million rose stems per annum from 80 hectares. The growers and chain partners who have access to the online EFM portal will see management dashboards where the performance of the KPI is indicated with a traffic light. Instant graphics, reports, trend analyses, benchmarking with other drilldowns can be generated, printed and exported to MS Excel or MS Powerpoint.

Based on trend analysis and EFM data in the online total quality management database, strategies for further improvement of the farm or chain can be defined and implemented. If farms or chain links are working according to their own or internationally recognized standards, they become much more reliable and stable, thus realizing trust and confidence among their buyers leading to long lasting buyer-supplier relationships.

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## **The response of traditional marketing channels to the growth of supermarkets and to the demand for safer and higher quality fruit and vegetables, with particular reference to Asia**

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### **Abstract**

*While the supermarket growth rates witnessed in OECD countries and Latin America have yet to be replicated and to have a major impact in Asia, there is clear evidence of significant growth in some countries, such as the People's Republic of China and Malaysia. Although growth in the marketing of fresh horticultural produce by supermarkets tends to lag behind that for other food products, hypermarkets and supermarkets are likely to become important fruit and vegetable retailers in much of the region. Within Asia, there is growing concern about food safety issues, brought on by evidence of food poisoning in some countries and high pesticide residues in almost all countries in the region. Supermarkets in Asia have tended to mirror the concerns in other regions over produce safety and this has been one of the factors causing some retailers to establish separate supply chains that bypass traditional marketing channels. The capacity of traditional channels to address food safety concerns has, to date, been extremely limited. Based on research conducted for FAO on the quality and safety of fruit and vegetables in traditional marketing systems in Asia and studies of supermarket development in Asia, this paper briefly reviews supermarket growth and procurement practices, the main problems encountered in addressing quality and food safety in traditional marketing chains and the reasons why it has been difficult to effect improvements. Drawing on experience from other regions, particularly Latin America, the paper then considers the adjustments that wholesale markets and wholesalers in Asia will need to make if they are to play a role in supplying supermarkets and the related steps they need to take to improve food safety and quality. The paper concludes that wholesalers must take on many of the characteristics of supermarket procurement, such as working with preferred suppliers and farmer groups, and using branding to promote quality characteristics. Wholesale markets will need to improve their infrastructure, operations and management and to seek imaginative ways of attracting business.*

### **Supermarket growth and fresh produce**

There has been rapid growth in the role of supermarkets in many parts of the world (Reardon *et al.*, 2003), although measuring exact market share is complicated by the lack of reliable data. While the quantities sold by supermarkets can be accurately

calculated, it is difficult in most countries to know the quantity of fruit and vegetables being sold through traditional marketing channels, although some work has been carried out to extrapolate data from discussions with a sample of wholesalers (Cadilhon *et al.*, 2006).

Although conventional supermarkets are important in some Asian countries, there has been a trend toward increased penetration of large hypermarkets and small convenience stores. In the People's Republic of China, 40 percent of urban shoppers already claim to spend more in hypermarkets than elsewhere. Japan leads the way in the development of convenience stores. Such local stores still have plenty of room for development in several countries and offer a significant threat to the traditional grocery store. For example, Tops in Thailand moved to counter the impact of competitive supermarket chains by opening smaller outlets in inner-city areas that combine the features of convenience stores and supermarkets (Chen *et al.*, 2005).

However, care must be taken in drawing conclusions about the impact of these changing retail trends on fruit and vegetable producers. Firstly, retail sales do not equate to total consumption. Institutions bypass the retail sector, as do caterers, although in some Asian countries, supermarket-style cash-and-carry wholesale chains, which handle fresh produce and supply the catering sector, are beginning to develop. Secondly, growth in sales of fresh fruit and vegetables by supermarkets tends to lag behind the growth in sales of processed food products. Thirdly, while there has certainly been growth in fresh produce marketing by Asian supermarkets, imported produce accounts for a significant proportion of their fruit and vegetable sales. Furthermore, supermarket supply chains for domestically grown produce may be relatively easy to develop for produce that is less perishable, such as watermelons, but much more difficult for produce that has a limited shelf life or requires a cold chain. Indeed, many smaller supermarkets stock only those fresh products that have a long shelf life (Digal and Concepcion, 2004). Finally, such developments must be seen within the context of a significant increase in demand for both fruit and vegetables.

Malaysia is probably that developing country where the supermarket trend is most advanced for horticultural produce. Not far behind is Thailand, where 40 percent of retail sales of fruit and 30 percent of vegetables were sold through supermarkets and hypermarkets in the Bangkok area, but a lower percentage in the context of the country as a whole. In the People's Republic of China, less than 10 percent of fruit and vegetables were sold through supermarkets in 2002, although the rate of supermarket growth continues to be rapid (Chen *et al.*, 2005). In the Philippines, 15 percent of vegetables are said to be sold through supermarkets in metro Manila, but a smaller percentage in the country as a whole (Digal and Concepcion, 2004). In the Republic of Korea, there has been a rapid growth in hypermarkets since 1993, but, even so, such stores still account for only 11 percent of fresh produce sales (Lee, 2005). In Indonesia, the figure is also put at around 10 percent (Natawidjaja and Reardon, 2006).

Thus most Asian households continue to buy fruit and vegetables from traditional retailers, even though they may use supermarkets for other products. The perception, and possibly the reality, is that wet market supplies are fresher and often cheaper. This is recognized by one chain in Thailand that focuses on fresh produce and aims to create

stores that resemble “shopping at the wet market near home” (Wiboonpongse and Sriboonchitta, 2004). Wet markets are usually more convenient for consumers accustomed to walking to make daily purchases. Supermarkets often lack a sufficient range of horticultural produce to encourage consumers to switch from wet markets, particularly outside the major cities (Digal and Concepcion, 2004).

Many factors have contributed to the changing food distribution systems in Asia, both on the demand and supply sides. These include the rapid increase in the number of people owning refrigerators, which has induced a shift from daily shopping in traditional retail outlets to weekly shopping in modern stores; the increasing number of motor vehicle owners, which has prompted larger volume grocery shopping at more distant locations; the entry of women into the workforce, which has increased the opportunity cost of women’s time and their incentive to seek fast and convenient grocery shopping; and changing consumer eating habits with an emphasis on easy-to-prepare meals. Changes in the family structure in Asia are being witnessed, with a growing number of nuclear families and one-person households, as opposed to extended families. An upward trend in the use of credit cards, which are still rarely accepted by corner shops or traditional wet markets, may also have had an impact. In addition, the development of supermarket chains has been spurred by infrastructure development, such as highways, retail technology and logistics.

### **Changing procurement practices**

Modern fruit and vegetable distribution necessarily calls for improved efficiency in the ways transactions between producers and their buyers are organized. Supermarkets are particularly concerned with the need to secure a steady flow of quality products that meet both the attributes required by their customers and can be priced at a competitive level. Characteristics of these transactions cover volume, frequency, price determination, payment conditions, logistics, delivery schedules, product standards, packaging and policies to deal with supplies that do not meet specifications (Chen *et al.*, 2005).

In many countries around the world there has been a shift from procurement by individual supermarkets, which may involve purchasing from wholesale markets, to a system involving a central buying office, with one or more distribution centres in a country. To date, relatively few chains in Asia have adopted centralized buying for fruit and vegetables, in part because they presently operate an insufficient number of stores to make a distribution centre viable. At present, there often remains a wide gap between retail expectations and the services actually being delivered by suppliers. Supermarket chains aim to increase both food safety and quality and reduce costs while increasing the volumes sold, but they have a difficult time meeting those objectives when using the traditional wholesale sector. Some notable drawbacks of traditional wholesalers are the inadequate use of refrigerated storage; packaging materials that undermine preservation of product quality; and the heavy reliance on manual labour, with poor handling that contributes to heavy losses. Market intermediaries also face problems in dealing with supermarkets. Purchase prices are often negotiated for a fixed period, such as a week, but can be renegotiated down by supermarkets if market prices decline in that period. Suppliers sometimes have to pay transportation charges from the distribution centre to

the individual stores and promotion fees where a product or range of fresh produce is featured in an in-store promotion. Discounts are required when new stores are opened. Penalties are invariably levied for failing to supply agreed quantities.

It is far better for a store to receive dependable deliveries from a few wholesalers or from a centralized distribution centre than to have to worry about buying from individual farmers or wholesale markets on a daily basis. In Thailand, 250 suppliers used to deliver perishable products directly to the backdoor of Tops supermarkets at least three times a week. "Incidents of out-of-stock were common and shrinkage in the store was high. The lead time between the farms and the supermarket shelves was up to 60 hours and due to the lack of pre-cooling and cooled transportation, the post-harvest losses were high. It was impossible to trace products back to the farm; there was no insight into farming practices and post-harvest practices. There were no clear uniform product specifications that could be communicated throughout the supply chain." (Boselie and Buurma, 2003) Tops centralized its purchasing, but most other chains in Asia, for the time being at least, prefer to procure through a limited number of wholesalers, instead of establishing distribution centres. There is some evidence that some chains are having second-thoughts about the distribution centre concept, given the significant distances that would be involved in many countries.

Many smaller chains continue to use individual store purchasing systems. Others continue to purchase through traditional wholesalers, such that even in the relatively sophisticated market of Thailand, the leading wholesale market, Talad Thai, near Bangkok, reports no loss of business. However, some chains are gradually shifting from those traditional wholesalers to "specialized or dedicated wholesalers" that are specialized in a few products and dedicated to supplying only one supermarket chain (Natawidjaja and Reardon, 2006). The specialist wholesalers, usually operating outside wholesale markets, are generally more responsive to the quality, food safety and consistency requirements of supermarkets than the traditional wholesalers who aggregate produce from many producers and may not be able to supply the quantities or qualities required. Other approaches include purchases from cooperatives or from farmer groups that may be coordinated by a leading farmer (Wiboonpongse and Sriboonchitta, 2004).

### **Capacity of traditional channels to meet safety and quality criteria**

Case studies indicate that in most Asian countries the main emphasis for the majority of poor consumers is on price. Nevertheless, in many countries, there is a growing demand among the upper middle class and in some, the middle class, for better quality fruit and vegetables, particularly fruit, which in many societies is considered a luxury item. In some countries, supermarkets are beginning to address this demand for quality, although "quality" is often seen in terms of appearance rather than eating quality. Attention paid by consumers to food safety is also growing, following recent health scares unrelated to horticultural produce (e.g. Avian Flu), as well as reported deaths and illnesses resulting from fruit and vegetable consumption. The main worry for consumers surrounds pesticide residues, but bacterial infections are increasingly causing concern. Between 1999 and 2002, there were a reported 250 deaths in the Mekong River delta of Viet Nam, caused by microbial infections, chemical contamination and natural toxins

associated with fruit and vegetable consumption (Giac Tam, 2005). China attributes 500 000 illnesses a year to pesticide residues with in excess of 500 deaths, but the percentage caused by fruit and vegetable consumption is unclear (World Bank, 2005). Surveys in almost all countries have identified high proportions of fresh produce with pesticide residues exceeding maximum residue limits (MRLs). Health scares have prompted special programmes, such as the “safe” vegetable programme in Viet Nam, the “Q” Mark in Thailand and the “green” and “pollution free” programmes in the People’s Republic of China. However, traditional marketing channels are facing considerable problems in meeting such standards.

In marketing systems with many levels it is difficult to handle significantly different qualities at the same time, particularly if one of the quality criteria is safety. Marketing of safe food requires monitoring on-farm practices, pesticide use and water cleanliness, as well as the provision of advice to farmers. Cost renders regular testing for pesticide residues impossible. Where a wholesale market trader buys from unnamed farmers through rural traders, it is exceedingly difficult to develop traceability. Furthermore, rural traders and transporters are not equipped to keep different qualities separate. While some grading is carried out, usually on the basis of size, there is little quality differentiation as traders are rarely able to buy other than “fair average quality” and are thus unable to provide the necessary incentives for farmers to improve quality. Most traditional marketing systems are not presently equipped for separate handling of different qualities en route to the consumer. Furthermore, the standard of fruit and vegetable handling in the marketing chain is often so bad that even if it were possible for traders to buy different qualities from farmers, there may be little quality differentiation by the time the consumer makes the purchase. At the farm level, farmers face problems with polluted water and other contamination. They have inadequate information about the dangers of bacterial infection and pesticide misuse and are often illiterate and forced to rely on the local pesticide retailer as their main source of information. Pesticide use is often encouraged by horticultural produce buyers, because this can lead to “attractive” fruit with no blemishes, but recommended practices are rarely followed. Produce is often harvested too soon after the last chemical application.

In several countries, traders are constrained by the poor infrastructure of the markets in which they operate. Poor structural facilities are often compounded by inadequate management that results in haphazard operations and unsanitary facilities. Through their associations, traders can work with market management to improve operations of markets and, *inter alia*, to improve quality and safety. This usually involves relatively simple day-to-day matters, such as pointing out the need for maintenance and cleaning (Shepherd, 2005). In many cases, markets are also places where considerable post-harvest activities take place. Trimming and removal of outer leaves; removal of damaged produce; sorting and grading; ripening; repackaging; and watering to keep produce fresh or, at least, to give it an appearance of freshness, may all be carried out.

Waste disposal arrangements are often poor. Post-harvest activities frequently take place on the bare earth. In many countries, there is reluctance on the part of municipalities to invest in markets. While municipalities may, as a consequence of congestion, be prepared to construct new markets, it is often difficult to persuade them to make improvements to existing markets. Retail markets are often of poor quality or

non-existent. In the absence of organized markets, the number of street vendors and itinerant traders has sometimes grown rapidly.

Few traditional traders own vehicles for their trading operations. The frequently seasonal nature of their work, the investments required, the inability to secure sufficient product to fill a truck and the complexity of running a vehicle means that most prefer to hire transport. Unless they are able to hire an entire vehicle, they are not really in a position to control the way in which produce is handled. Smaller traders may thus find their produce being squeezed into a truck together with that of other traders, trampled on in the loading process and badly handled on arrival. Post-harvest handling training activities provided by governments and donors are nearly always targeted at farmers. Rarely is training offered to traders. Thus, they may not be fully aware of the causes of the quality problems that they experience on a daily basis and therefore unable to implement activities to improve product quality. Initiatives to promote safe food are generally not known by the trade. In the People's Republic of China, labels used for "green" food, "organic" food and "pollution-free" food are not well recognized by traders and many are unclear about their meaning (World Bank, 2005).

### **Response of traditional marketing channels**

There are several examples of where Asian wholesale markets have taken steps to respond to supermarket growth. Talad Thai market in Bangkok is the largest fruit and vegetable wholesale market in Asia. Several supermarkets have established distribution centres in the market and there are six specialized wholesalers based there who deliver to supermarket chains. To address the concern of supermarkets for produce safety, in particular relating to pesticide residues, Talad Thai plans to establish a laboratory for pesticide residue testing. Shou Guang in Shandong Province is the largest vegetable wholesale market in China. Several distributors are equipped to supply supermarket chains. The Shou Guang Vegetable Distributor Co. has temperature-controlled storage rooms with a capacity of 1 500 tonnes and cold storage with a capacity of 1 000 tonnes as well as a 5 000 m<sup>2</sup> distribution centre. Similarly, Long Shan Wholesale Market in Shanghai has established a distribution centre to supply vegetables to supermarket chains. This centre presently accounts for 8 to 10 percent of the total market turnover (Chen *et al.*, 2005).

Lessons can also be learned from Japan where wholesale markets have faced "bypassing" pressure from large supermarket chains (Chen *et al.*, 2005). Approximately 80 percent of vegetables still go through wholesale markets, but this is expected to decline to around 70 percent. As a response, wholesalers have become more proactive. They pass market information onto producers and also provide management training and emphasize partnership building with farmers. Wholesalers are also merging and restructuring in order to cope with the increasing size of agricultural cooperatives and supermarket chains. Auction was once the dominant mechanism for price discovery in vegetables, but it now accounts for only 5 percent of the vegetables sold in the Ota wholesale market in Tokyo. This change occurred in the late 1980s and early 1990s. One of the reasons for this was that supermarkets required delivery in-store before 10.00, which is not considered possible under the auction system.

Some traditional marketing channels are already beginning to demand higher standards from farmers in response to consumer demand. However, Asian consumers remain very price-sensitive. While traders may tell farmers to produce better quality and may raise their minimum buying standards, those traders may not be in a position to pay more for higher quality. There is also some evidence that initial price premiums for higher quality or “safe” produce will erode over time. There is likely to be resistance from farmers if quality improvements require investments that are not rewarded, unless failure to make such investments results in an inability to make sales. Consolidation of horticultural farmers is perhaps inevitable, and is already being witnessed in other parts of the world.

If traditional channels are to offer higher quality and safer produce, it is likely to be through individual traders dedicating themselves to marketing high quality fruit and vegetables. This will require the development of linkages with farmers or farmer groups, mirroring what is already being done by supermarkets. This is being carried out in the Republic of Korea, where wholesalers contract directly with farmers and implement their own inspection system (Lee, 2005). Another example of such a development comes from Ho Chi Minh City, where a lettuce wholesaler carefully coordinates his supply chain in collaboration with a selected group of field collectors. The wholesaler shares information about market conditions with the collectors and makes orders five days in advance, to enable the collectors to identify the best sources of supply. He provides his collectors with training in harvesting and packing, so enabling him to obtain higher than average prices and reduce losses (Cadilhon *et al.*, 2005). There are also examples of similar developments from Latin America. Wholesalers from Antioquia in Colombia train their fruit suppliers on business management, clean production and quality assurance, with emphasis on compliance with packaging and MRL standards. In Argentina, the Buenos Aires wholesale market (*Corporación del Mercado Central de Buenos Aires*) also offers training on food quality and safety for fruit and vegetable producers. Employees from the quality control unit of this market have recently worked with producers from the province of Neuquen to improve the quality and safety of the leaf vegetables supplied (Gálvez, 2006).

### **Scope for future improvement**

As noted above, a few wholesale markets in Asia are already beginning to offer large and modern facilities to companies dedicated to supplying supermarkets. Wholesale markets are likely to develop separate facilities to handle quality produce. The creation in the markets of what are known as “logistics platforms” to serve the needs of supermarket buyers, as has been done in Italy and Spain for example, is worthy of consideration. Some of the biggest Latin American wholesale markets (Buenos Aires, Sao Paulo, and Mexico City) have already made plans to develop logistic platforms to serve supermarkets and exporters better. In some cases, new market sites have been constructed to facilitate logistics platforms and other markets, such as Montevideo in Uruguay, Adelaide in Australia and Naples in Italy, are planning similar moves.

Small-scale retailers will continue to play an important role in Asia. With increasing affluence, people will eat out more. Both retailers and caterers will be attracted by the provision of wholesale cash-and-carry facilities. Such a store in a wholesale market



compound would enable traditional fruit and vegetable retailers to diversify into selling new products. Market logistics may need to be re-examined, together with trading hours, in order to maximize the convenience for customers and minimize the delay between harvest and sale. Wholesale markets need to look to their strengths. In some cases, for example, they should be able to supply fresher produce than supermarket chains. Clearly, such developments will be easier for markets in some countries than in others, but the countries where improvements will be easier to bring about are, by and large, those where traditional systems are under the most immediate threat from supermarkets.

In Beijing, farmers supplying the city's retail or wholesale markets sign an exclusive production contract, specifying the production base, implementing standardized production and taking responsibility for product safety. All over Asia, farmers wishing to access high-quality markets will almost certainly have to work together as members of formal or informal groups, following the same technical package. Individual small farmers cannot produce sufficient quantities to supply the needs of large buyers, and market intermediaries do not want to work with scattered farmers, preferring instead to buy from farmers in one particular location. Working in groups also offers the possibility to invest in appropriate post-harvest infrastructure, such as grading facilities and cool stores, and to develop a brand name. At present, the consumer relies on the supermarket to provide the assurance that produce meets certain standards; groups of farmers may in the future be able to provide that assurance by labelling their own products (Anh and Minh, 2005). Wholesale markets could also develop quality labels as is being done in Montevideo. The *Mercado Modelo de Montevideo* has implemented a voluntary quality control programme to ensure that fruit and vegetables sold in the market comply with the Mercosur quality standards. That produce which does not comply with these standards is still sold, but with an indication of non-compliance with the standards (*fuera de norma*). Consumers have responded well to this programme. At present, fruit and vegetables marked with the quality label obtain a premium of 8–16 percent above the price for non-labelled produce. Furthermore, the turnover of higher quality produce is much greater (Gálvez, 2006).

Over the years, FAO has devoted considerable effort to encouraging governments and municipalities to improve the infrastructure available for marketing. While there have been notable improvements in market infrastructure in some countries, in many Asian countries, the quality of assembly, wholesale and retail markets is far from adequate. Governments need to view markets as more than just sources of revenue, particularly if they wish to see traditional marketing channels survive in the face of competition from supermarkets. There is also scope for private investment in markets, possibly through some form of public-private partnership.

As already noted, supermarkets are moving to direct procurement arrangements, either working directly with farmers or farmers' groups, or working through dedicated wholesalers. Wholesalers working in traditional wholesale markets cannot dismiss these trends as a supermarket fad. They will need to strengthen linkages with farmers and improve logistical arrangements along the lines of the good commercial practices that supermarkets are beginning to insist on, which could include developing rural packing houses. To keep pace with the demands of modern buyers, farmers, assisted by their

traders, can adjust by: specializing in a particular commodity; consolidating fragmented land holdings to achieve scale economies where this is permitted by law; and forging stronger links with wholesalers. Assemblers, wholesalers and retailers can also adjust by paying more attention to managerial requirements and capacity building in areas such as contract negotiation, management of operations for contract compliance and monitoring of production performance, including environmental impact. In the Republic of Korea, for example, wholesale markets procure from cooperatives on the basis of contracts (Lee, 2005). An increased emphasis on quality and safety will be required, particularly in relation to pesticide residues. Direct linkages with farmers should also facilitate traceability in the event of problems.

Faced by a static or declining share of the market, traditional marketing systems can try to increase their share again, but this may be difficult. An alternative approach is to work to increase the total size of the market. Several countries have adopted “five-a-day” promotions to encourage people to have five servings of fruit and vegetables a day. Markets would appear to be the ideal organizations to develop such programmes and publicity campaigns. The wholesale market of Buenos Aires and the Argentinean 5-a-Day Foundation organized various activities to celebrate the “Healthy Eating Week” in October 2006, in order to promote the consumption of fruits and vegetables (Gálvez, field observations). This initiative is expected to be replicated every year at around the same time.

Finally, possible marketing channel improvements are not limited to wholesalers and wholesale markets. Retail markets can also respond to supermarket competition. In Honduras, for example, a farmers’ market has improved security and provided shopping trolleys for market users (M. Lundy, pers comm.). In Malaysia, the Federal Agricultural Marketing Authority has promoted a successful network of weekend farmers’ markets.

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## **Developing consumer trust in ethical food supply to meet increasing market interests in credence purchase**

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### **Abstract**

*Trust is the key to ethical food marketing, where consumer “pull” is dominating demand and credence purchase supply. Consumer preferences, concerns, fears, politics and beliefs seem increasingly to govern new food marketing opportunities based on the nature of food production systems. Most of these “extrinsic” properties of food, relating to husbandry approaches and the production environment, are difficult to verify at the point of sale – requiring such credence purchases to be embedded in trust, confidence and ethical traceability both in the product and in systems of supply. Affluent consumers can also afford to pay more attention to such issues as environmental protection, animal welfare and social considerations underpinning this food production on farm. At the same time, these affluent consumers also pursue competing attributes such as “intrinsic” properties governing nutritional characteristics and health issues. The “food integration” concept embraces food safety, technical and credence attributes – but “extrinsic” properties arguably require much improved consumer communication. Projecting a “sense of caring” of benefit to society, through food supply, is commendable and an attractive approach to agrifood business, providing also opportunities for both “adding value” and product diversification. It can equally deliver a vehicle for Corporate Social Responsibility (CSR) strategies. This only applies, however, if such claims can be verified, and are transparent, honest and justifiable. Both quantitative and qualitative measures of assessment are recommended as a basis for ethical risk assessment. Fairtrade, Freedom Food, Assured Food Standards and the LEAF Marque schemes are explored. The basis for more ethical trading is examined – and an attempt is made to determine whether consumers “get what they expect” – and more importantly “get what they pay for”.*

### **Background**

Ethical consumerism (Mintel, 2006) may only be a relatively small sector of mainstream retailing currently in many countries, but it is becoming an increasingly significant driver of consumer purchase choices in Europe (Davies and Baines, 2005). Consumer attitudes to food supply (both food manufacturing and retailing) back to primary production have changed considerably in recent years, in the United Kingdom especially, in contrast to public perceptions of many other industries (IGD, 2006a). Shoppers exhibiting ethical purchasing decisions have reportedly increased from 26 percent in 2004 to 39 percent in 2006 in the agrifood sector (IGD, 2006a). Ethical spending on food, transport, energy, travel and financial products has risen steadily over the last seven years in particular in the United Kingdom to reach a record high of £29.3 billion (pounds sterling) in 2005 (Co-operative Bank, 2006). Spending on organic and fair trade food products alone has reportedly grown 62 percent since 2002, to a value of £2 billion in 2006 (Mintel, 2006). According to the IGD (2006a) 33 percent of shoppers in the United Kingdom are ethical activists, where beliefs and lifestyle determine consumer purchases, and 25 percent of shoppers in contrast are not ethically sensitive. Overall ethical spending increased by 11 percent between 2004 and 2005, and according to the Co-operative Bank (2006), “ethical” foods increased overall by 18 percent over the same time period to reach £5.4 billion.

Food supply is dominating ethical market growth commercially in the United Kingdom, but it raises many questions of consumer perceptions, trust, potential food fraud claims and retailing approaches. Can so-called ethical sourcing be trusted (Gabriel and Lang, 2006)? Is the label or brand a “seal of trust”? Do attitudes and lifestyle claims translate to actual food purchase decision-making? Our desire for “things to be better”, which we hope can be secured (at least in part) by more ethical behaviour (including consumer behaviour) is grounded in trust. Can “soft” quality assurance schemes justify appropriate credence purchases – or is much of it a self-deception? Should we vest our trust in the retailer as “gatekeeper”, rather than the brand or label – or are their projected ethical sourcing image-building just perhaps merely “green wash” (according to Justin King of Sainsbury’s supermarkets).

This paper will comment on the growth of ethical food product supply, against a background of growing ethical consumerism, as a driver of agrifood business. Consumer perceptions, quality assurance and building consumer trust towards improving ethical supply will be explored.

### **Ethical perspectives**

“Ethics” derived originally from the Greek word *ethos* meaning conduct, customs or character, involves the application of morals and beliefs to human activity (Manning *et al.*, 2006). FAO (2004) interprets ethics as the “principles and standards that define behaviour, actions or rules of action that are considered (by some) to be right, good and proper”. Ethical norms of behaviour are based on “what ought to be”; “what ought to be done” and “how things should be done” by adherents. Most of these are deeply embedded in religious beliefs, tradition, social behaviour and regulation. Other ethical considerations are more “highly personal”, based on diverse beliefs (Bhardwaj *et al.*, 2003).

There are several theories underpinning the study of ethics which focus, basically, on either “the morality of actions” the “consequences of sanctions” or the basis of “motives”. They are grounded in those theories which emphasize “duties” (deontological); those (utilitarian) theories which emphasize “the greater good for the greatest number of beneficiaries”, and those that deliver “egoism” emphasis in theories that address the “achievement of the greater good for the moral agent” (FAO, 2004). In practice, people and organizations express and exercise a mix of these emphases towards ecocentric behaviour (based on concerns for ecosystems and environments); biocentric actions (relating to concerns for particular species of animals or plants) and anthropocentric activities (focused on concerns for man and society). Quite clearly, there is a multiplicity of religious, cultural, linguistic and traditional ethical beliefs globally – which makes the analysis and interpretation of these issues highly complex.

Ethical influences on food purchase can be grounded in intrinsic characteristics perceived, for example, to be beneficial to health and well-being by the customer, many of which are proven and promoted properties (some of which could be verified at the point of purchase, if required). Other perceived properties by the customer, based for example on the methods of food production that are considered ethically desirable, have so-called extrinsic characteristics (Davies and Baines, 2004; Hansford *et al.*, 2003). Labels, logos and credence can provide, in these instances, a better basis for consumer trust.

#### **Ethical consciousness and consumerism**

Recent surveys reveal an increasing consumer interest in ethical issues influencing product purchases, particularly in the agrifood industry sector (e.g. IGD, 2006a). The Institute for Grocery Distribution (IGD) reports that an ethical shopping emphasis is growing in the United Kingdom at a rate of 7.5 percent per year, which is a higher rate of growth reportedly than the conventional grocery trade. Approximately 85 percent of consumers in the United Kingdom believe, reportedly, that the food industry in particular should be leading corporate social responsibility initiatives based more on social, ethical and environmental principles (IGD, 2006a), as shown in Table 1.

**Table 1: Comparison of ethical consumerism across some British industries**

<b>Main shoppers (percent) making ethical purchases</b>		
<b>Industry</b>	<b>2004</b>	<b>2006</b>
Clothing manufactures	12	17
Car manufacturers	19	17
Pharmaceuticals	19	18
Food Service	15	17
Food and Drink Manufacturers	26	37
Food Retailers	35	60
Farmers	27	42

Source: IGD, 2006

Although there is a high level of consciousness of ethical issues, there does not always seem to be a good understanding of the issues of concern and how they may interrelate, as shown in Table 2 (IGD, 2006a).

Surveys rarely give the same answers, but successive studies by Mintel (2006) also suggest that ethical consciousness in the United Kingdom is increasing, as shown in Table 3.

**Table 2: Shoppers who believe ethical issues are quite or very important to purchase decisions**

Issue	Consumer (percent)
Recycling	74
Environment	73
Animal welfare	67
Fair trade	67
Free-range livestock	62
Organic production	45

Source: IGD, 2006: survey of 1 000 consumers.

**Table 3: Increasing ethical consciousness in Britain**

Consumer Response (percent)	2002	2006
Strongly believe that people have a duty to recycle	65	75
Consumers who buy “Fairtrade” products where available.	26	34
Buy “free-range” livestock products whenever possible.	33	40
Consumers who consider it worth paying more for “Fairtrade” organic and locally-sourced foods.	20	34

Source: Mintel, 2006

### Consumer concerns

How and where people shop and reach purchase decisions is complex, and influenced by many factors. For some the local farmers’ markets may be important; to others the family-owned corner shop, or the particular supermarket. It is often, for many, a mixture of these with consumer shopping promiscuity and less outlet loyalty, depending on needs, convenience and occasion.

The United Kingdom Food Standards Agency (2006) reveals, through surveys, that information sought on food labels is currently dominated by nutrition with ethically related information issues being less consulted. It seems, from labels, that ethical information (in the United Kingdom) is mostly being sought by a committed minority rather than the majority (Table 4).

What consumers “say” might be radically different from what they “do” (FSA, 2006) – as with the “5-a-day” scheme (Table 5).



**Table 4: Information usually looked for on food labels in the United Kingdom**

	Percent	
	2004	2005
Amount of fat	56	60
Amount of salt (sodium)	44	53
Best before or used date	64	49
Amount of sugar	44	48
Calories	28	28
Cooking or storage instructions	36	27
Country of origin	22	22
Health claims (e.g. “low fat” or “good for your heart”)	26	18
Quantity of the main ingredients	22	17
Whether the produce is of GM or non-GM origin	23	16
Vitamins	12	15
Production methods or other ethical information	19	15
List of ingredients for special reasons (medical, religious or dieting)	13	14
Name of the food	15	12
List of ingredients for specific allergy reasons	12	11
List of ingredients for other reasons	15	11
Whether the products are organic	13	8
Suitability for a vegetarian diet	9	7

Source: FSA, 2006: 2 650 respondents.

**Table 5: Awareness in the United Kingdom of “how many portions of fruit and vegetables do you think you should eat every day?” i.e. “at least five portions of fruit and vegetables”**

	Percent	
	Aware	How many have actually eaten “five a day”?
2000	43	26
2001	49	25
2002	51	25
2003	59	28
2004	58	51
2005	67	30

Source: FSA, 2006

### **Ethical diversity**

Beliefs and ethical values can differ considerably, in different parts of the world, due to very many factors including (as mentioned) religious, cultural, linguistic and traditional values. In these circumstances different types of ethical retailing need to recognize market differentiation on the basis of credence values. Different attitudes to animal welfare considerations in livestock production across Europe, emphasizing contrasting

attitudes in the north and south, have previously been noted (Davies and Baines, 2004; 2005).

Religious belief is amongst the most powerful influence, with some religions precluding particular sourcing and food ingredients (Fieldhouse, 1986). These beliefs can also influence other attitudes, such as genetically modified (GM) crop adoption in the agrifood system leading to so-called “genetic” food production. These attitudes are little understood at present.

In the United Kingdom there is also a class consciousness in attitude to ethical concerns about foods, that may reflect wealth, product choice and lifestyle attributes (FSA, 2006), as shown in Table 6.

**Table 6: Information sought on food labels in the United Kingdom by different social classes**

	Social Grades (percent)		
	Upper classes better educated and more wealthy	Middle class	Lower class less educated poorer
	A, B	C 1, C2	D, E
Nutritional information	79	73	69
Ingredients	64	58	52
Ethical information	26	13	10

Source: FSA, 2006

Location in the United Kingdom has also been shown to influence the ethical marketplace in consumer purchases (IGD, 2006a), as shown in Table 7.

**Table 7: Percentage of shoppers in different regions of the United Kingdom who believe organic production and foods are important**

Region	Percent
London	71
South	46
Midlands	45
North	35
Wales	45
Scotland	30

Source: IGD, 2006a

### **Political support**

Radical reforms of the Common Agricultural Policy (CAP) in the European Union in 2003 shifted the emphasis of support from quantity, and produce subsidies, to decoupled quality standards. High productivity goals, to prevent food shortages, have been replaced by higher standards of “environmentally friendly” land management, animal welfare and public health through so-called cross-compliance support

instruments (Fischer Boel, 2006). These changes provide a “strong incentive” for more “ethical” European farming (Fisher Boel, 2006).

The European Union is determined to promote the linkages of food “quality” perceptions to Europe’s “agri-culture”. Specific labelling identity, such as through Protected Geographical Indications (PGIs), command regional branding recognition and associated qualities considered to be worth a financial premium. Food product fame, built through years of production efforts in specific regions of Europe, is considered worthy (Fischer Boel, 2006) of separate and special recognition. Protected name status confirms authenticity and origin of recognized foods – addressing many ethical purchase objectives and lifestyle consumption demands of consumers. Currently 36 products are registered under this scheme including, from the United Kingdom, well-known and highly regarded Welsh Lamb, Jersey Royal Potatoes and Blue Stilton Cheese. These higher-value named products also have increased credibility in growing export markets seeking greater “quality” recognition (such as the People’s Republic of China and India).

Traditional foods and drinks in Europe have long been enjoyed, and have significant reputations, and these qualities are now more consonant with agricultural policy change towards “quality” in its widest sense. Ethical traceability to inform consumer choices appropriately remains, however, a key supporting issue (Coffe, 2006; Barling, 2006).

### **Snapshots of ethical assurance schemes – features of some major ethical initiatives**

#### **Fairtrade Foundation** (Hill, 2006; Barrientos and Dolan, 2006)

- To provide a better deal for third world producers;
- Fairtrade works with 500 producers’ organisations in 58 countries, supporting over 5 million beneficiaries;
- Fairtrade Labelling Organization unites 21 national Fairtrade initiatives;
- Fairtrade scheme established in the United Kingdom in 1992 covered over 2 000 retail products and services in 2006;
- 50 percent of adult consumers recognize the Fairtrade trademark in the UK;
- More consumers (+ 15 percent) and sales (+27 percent) of Fairtrade products from 2004 to 2005;
- Fairtrade food and non-food sales in the United Kingdom reached £193.8 million in 2006.

#### **Assured Food Standards** (Clarke, 2006)

- To improve agreed standards of agricultural produce and provide greater consumer confidence;
- “Red Tractor” kitemark in the UK (launched 2000);
- “Assured Food Standards” (launched 2005) in UK;
- Includes 80 000 farm members and 350 companies licensed to use the Assured Food Standard’s logo;
- Covers 90 percent of British pig production on farm; 70 percent cattle; 100 percent poultry production; 90 percent of British dairy production; 67 percent of

fruit; 91 percent of salad cropping, and 80 percent of the combinable crop production in the United Kingdom.

**Freedom Food, RSPCA scheme** (Grant, 2006)

- To “improve farm animal welfare”;
- Freedom Food initiated in 1994 in the United Kingdom (the RSPCA was founded in 1824);
- Membership of 2 200 livestock farmers;
- “Animal” membership now 46 million (2006) from 17 million (in 2004);
- 55 percent of adult consumers in the United Kingdom give “animal welfare” as a significant ethical concern.

**LEAF marque** (Drummond, 2006)

- To “promote integrated farming systems: linking farming and improving environment”;
- Whole Farming System emphasis;
- Involves 300 farmers and 5 million consumers in 2006 in the United Kingdom.
- Covers 68 000 ha of combinable arable crops (cereals, oilseeds, legumes) and 46 000 ha of fruit and vegetables in the United Kingdom;
- For example, sales worth £190 million of LEAF Marque certified products in British Waitrose Supermarkets.

**Assurance and auditing of ethical claims**

Penetration into ethical markets is based on consumers believing they know about the product and how it has been produced – this requires information linked to the product. It is also critical that they trust in this information and in those who provide it.

If the chain between producers and consumers is short and local, then much of this trust can be built up through personal relationships, with the consumer “knowing” the producer or purveyor and vice versa. This relationship can go further with consumers living next to production and having an intimate connection with that “environment” Furthermore, should any partner in the chain break that trust, then there is every chance that this will become known and this can affect the local market. Under such conditions it is the reputation of the supplier that is known and there is little need for any form of labelling beyond branding, and little need for certification.

The above relationship can break down, however, if several local suppliers are using a common brand. Under these circumstances, agreed codes of practice may be required and some form of assessment is needed. However, there may not be a need to establish a complete auditing and tracking system as it is still possible to maintain the ethical standards and claims through appropriate peer pressure. In other words the producer group can “police” individual members.

Maintaining these channels of trust and communicating the right message becomes difficult when group membership becomes large or when production and consumption are separated by longer distances. Under these circumstances it is important to underpin the claims with appropriate standards backed up by independent certification. As more

food is sourced globally and as ethical consumerism grows, so have ethical certification standards.

In order for an ethical standard to be successful the following attributes must be developed and known by all involved from production to consumption.

There must be a set of standards developed, which objectively address the issues of ethical supply. Often these standards will evolve through dialogue with interested stakeholders. From this set of standards, an audit protocol must be developed and a mechanism for inspection and certification developed. In order to harmonize with other standards' objectives (like food safety and quality) such standards should operate to ISO Guide 62 or 65 and be inspected by accredited certification bodies. Such audit protocols must have the capacity to withdraw certification from individuals who breach these standards.

The above integrity needs to be communicated to the end of the chain and consumers. This may require branding for recognition and promotional information to allow consumers to know and understand the ethical dimensions of the product.

It is also important to build in some form of review system to ensure the standard remains current in the eyes of ethical consumers.

Several standards have developed in this way, including organic standards, animal and worker welfare standards, standards for wildlife and biodiversity as well as religious certification standards.

A final development in this trust relationship is evolving in food retail and food service. In order to avoid the difficult task of understanding all of these standards, retailers and food service providers are developing a corporate ethical offering where they have made all of the sourcing decisions on behalf of their customers. Under these circumstances consumers trust and know their local store even though it may be a multinational sourcing from all around the world.

### **Conclusions**

Consumer relationships with food, both production and supply, will remain both complex and intimate – but ethical dimensions influencing perceptions and purchasing decisions seem to be increasingly significant, at least in the United Kingdom. Opportunities for quality improvements of products and supply, giving greater sustainability benefits; bonuses for society and added-value premiums for producers are increasingly attractive.

In these supply systems greater ethical traceability is recommended to “capture and map the ethical dimensions of practices and processes in the food supply chain” (Coffe, 2006; Barling, 2006). To provide a basis for future ethical training, and to address consumer concerns better, five key issues have been highlighted in a 2006 European study ([www.ethic-trace.net](http://www.ethic-trace.net)):

- “Ethical aspects of the (hi)story of foods are often hidden” but appropriate assurance schemes can help better tell the “story”;
- Ethical issues in food supply chains are not well communicated, and need to be clarified for better consumer awareness;
- Relationships between stakeholders in food supply chains need to be strengthened from an ethical viewpoint, to provide a more coherent delivery system;
- Ethical traceability could help to prevent the communication of misleading and deceptive information to consumers;
- Consumer concerns should be more explicitly embraced in ethical decision-making in the food supply chain, through better partnerships and dialogue, to strengthen ethical supply.

This market sector will continue to grow – but, hopefully, in an appropriate and more genuine whole supply chain manner.

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## Supermarket own-labels for fresh produce<sup>27</sup>

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### Abstract

*About 15 years ago, the number of prepacked produce lines increased to such a level that Tesco in the United Kingdom decided that a retailer's own-label was needed to create uniformity for customers. Previous to this, prepacks had come in a variety of supplier brands. The introduction of own-label produce was very important in the campaign to create a quality image for Tesco. In the United Kingdom all produce prepacks are now own-label. There are very few supplier brands to be seen, with the exception of bananas, pineapples and citrus. Producers around the world are growing crops for Tesco's own-label. However, the prepacking of own-labels tends to be done in places nearer to Tesco's distribution centres. Tesco is currently implementing trials to prepack own-label products in countries such as South Africa. This will reduce costs and better manage quality and date coding. In developing an own-label range, the key aims must be to develop customer trust in the value and quality of the brand. Tesco has also differentiated its own-labels with three different brands appealing to different consumer market segments. As producers work more in partnership with Tesco, their businesses tend to develop and grow in parallel with Tesco's. When producing own-label products they tend to be more efficient and put greater attention to detail than their competitors. Tesco Lotus has plans to start implementing an own-label strategy for fruit and vegetables sold in its Thai stores in the near future.*

Tesco started business in the United Kingdom in the early 1920s with a vision that is still in place today. We are now operating in 14 countries around the world including the United Kingdom, the Republic of Ireland, the Czech Republic, Slovakia, Hungary, Poland, Thailand, Malaysia, the People's Republic of China, Japan, the Republic of Korea, and we will open in the United States of America in 2007.

Retail own-labelling is something that has been very strong in the United Kingdom and is something that Tesco is very proud of. Why we have our label and the Tesco name on most of our products is a bit of a mystery to many customers and many people, but it does give customers a huge amount of choice. It also encourages loyalty. They can only buy Tesco products in Tesco stores, so I suppose that is a bit of a win for Tesco trying to get people in through the doors. We help develop diversity, so we can give customers a real range of products across the whole range and it also gives us an opportunity to follow the lifestyle trends that are happening around the world.

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<sup>27</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management



However, Tesco doesn't just sell Tesco. We sell loose products, with no packaging and no brand name, just as you would find in a traditional market. Our value brand which is functional food, is the lower quality, but also the lowest price; the standard range is the mid-range, traditionally the European classifications of Class 1 and possibly Class 2; our finest is our very premium brand, which gives us an opportunity to promote varieties, countries of origin, and sources, and give more affluent customers more choice.

We also sell organic, "free from" which is free from wheat, gluten, etc., and we are heavily promoting Fairtrade. We believe in the philosophy behind it and we are proud to put the Fairtrade brand on our products. Healthy living, giving people a choice whether they want to eat a little more fat to get a little bit more taste, a little bit of extra sugar, a little bit of extra salt, we make it available so that they don't have to if they don't wish to. We have a kids' brand. Children are probably the most important factor for our business, because they are the consumers of the future, and there are billions around the world. But we want them to be around for the future, so we don't want them to be eating unhealthily. They also want a bit of fun in food as well.

We promote local. This is something new to the United Kingdom. The United Kingdom produces a significant amount of what Tesco sells within the country, and every region has its own preference, Jersey Royal potatoes or Cornish cauliflower for example. Consumers in their own region, just as they are around the world, are very proud to be associated with their region, and we believe that it is important that they can feel that sense of pride with the purchases that they make.

Wholefoods are built around the chefs and the people who want to break the ingredients out and not to buy composite meals, but actually want to buy the individual products. We want them to feel pretty good about it.

In our world, GI is glycemic index, not geographical indication. Glycemic index is a way of looking at food and eating more healthily to provide more sustained energy, like oatmeal porridge in the morning. It will have a slow release and a slow burn of the energy and help you feel fuller for longer and help you plan your diet through the day.

The Tesco brand also provides an opportunity for innovation. All of our products are tested through consumer panels which gives us a fairly high success rate. Up to 95 percent of the products that have been launched by Tesco are still selling today. There are some failures, as always, but the rate is much lower than in the past. In 2006, we launched 8 000 new lines. The development is not necessarily led by ourselves: we work very closely with our suppliers around the world to source the very best products from new locations, new sources, and new varieties, because consumers are very fickle people. We are all consumers and we all want to have the choice and the variety. We also monitor the competition and if somebody is selling a product from a certain region, we look at that product. If it satisfies our consumers, then we will probably enter that market as well.

At Tesco we have two values: "No one tries harder for customers", is right at the core of what we do. Our other value is to "Treat people as you would like to be treated", which

introduces the ethical values and the brand values that go behind everything that we put our name to. Tesco puts the customer and the product right at the heart of everything that it does.

Our core purpose as a retailer is to create value for customers to earn their lifetime loyalty. This is quite a powerful message and it is also quite a simple statement. Tesco has been around for some 80 years and we want to be around for the next 80. In global terms, 15 years ago, Tesco was the number four retailer in the United Kingdom. Through hard work, a lot of focus, a lot of energy around the consumer and the products and the brand, we have now developed from being number four in the United Kingdom to being number four in the world, with plans for expansion that will see more of our business generated outside the United Kingdom.

The philosophy behind Tesco is quite simple. We will do whatever customers want us to do to give the products and the prices that customers expect on a daily basis. Most of our stores operate 24 hours a day, seven days a week and the competition is very strong. Some people think that being a retailer is very easy, because all you do is collect the money. Actually, being a retailer is probably one of the most difficult parts of the supply chain. We strive to improve and to delight our customers on a daily basis. If we can deliver value, quality, service and a competitive price to all our customers, we may succeed in creating the value that they expect and earn for us their lifetime loyalty.

Customers expect a lot from retailers. They expect high standards like British Retail Consortium (BRC) or GLOBALGAP and high-quality products that are consistent, offer good value for money and protect our environment.

When we decide to run with a new product, we agree together with the supplier. Together we write the specifications. After first approval, we test the product to ensure that it complies with the specifications – do they have the quality or not? Then, after the product has run for around one year, we conduct a PMP (product monitoring programme). This test is conducted by a third-party referee to check the quality, focusing on chemical and microbiological contamination. Then we work closely with the consumers in store. We establish a monitoring programme for a surprise audit or a surprise visit to the supplier to make sure whether the quality is good or not. If we find a problem, we ask our supplier to investigate and discuss with them ways to improve the quality improvement. This is our system. This is our system to make sure that all the products we sell in Tesco are safe.

For fresh produce, we talk directly to the farmer. At the farm level, we establish good agriculture practices (GAPs). We control what chemicals may be applied, when and at what rates. In Thailand, many farmers are poorly educated, so we try to improve their understanding. We invite the government to assist and to train the farmers. At the packing house, we demand GAP and have established both good manufacturing practices and HACCP-based quality assurance systems. We can trace the product to its source. From the packing house to the distribution centre we use cool chain principles. The truck should be clean, based on HACCP also. After we send the product to the store we continue to check the quality of the product. We check around two times per year and focus on chemical, microbiological and physical contamination. If we find a

problem, we talk about it to the supplier. We investigate and we take preventative action. If we found that the same problem was reoccurring, then we evaluate our relationship with that supplier and potentially cease to do business with them, because we want the best-quality product.

In managing the supply chain, we set the standard for the farms and farm management. We audit and approve all vendors against national and European Union standards. These standards are checked at the control point and distribution centres. This means that we operate quality control at both the packing house and the distribution centre. For Tesco's supply chain, there are many benefits. First, we focus on the grower gaining a clear understanding of the customers' requirements. The vendor has to improve to meet their customers' needs. Growers and packers can benefit from a reduction in the discount. Growers are on a level playing field: all must meet the same standards, irrespective of the product origin.

Right now we have about 300 stores in Thailand. We have two distribution centres: one in Ayuthaya province and a new one in Nonthaburi province. During transport both to and from the distribution centre we use the cool chain. We control the temperature because we want the best quality. The product is very fresh. We appreciate what the customer wants: freshness, quality and freedom from chemicals. In 2004, we found that up to 11 percent of the produce inspected exceeded our pesticide residue limits. In 2005, this had fallen to two percent; and in 2006, we have not found any pesticide residuals. This is what Tesco stands for. These are our values. This is how we succeed in business.

Currently, we have around 60 vendors in Thailand, more than 500 contractor growers and around 500 products, valued at THB7.8 billion per year. Our own label shows the product name, the vendor's name and address, and displays the "best before" date. Next year we plan to add more nutritional information to encourage healthy eating.

DELEGATE: When Tesco is operating in developing countries, you demand from your suppliers' certification like GLOBALGAP and BRC. Is that not a problem?

MR SUTTON: Within the British market we are quite fortunate with a sophisticated supply base. Everything that we sell within the United Kingdom is 100 percent-certified BRC and GLOBALGAP, and we also have our own Tesco Nature's Choice which goes a little bit further than GLOBALGAP. In the developing countries, we try to work with producers to develop these standards. The standards can't be achieved overnight and we appreciate that. What Tesco and Tesco's consumers are looking for is a guarantee that the products they find in our stores are safe and legal and of the right quality. If that certification isn't available today, then we will underpin it with due diligence through the supply base and through ourselves by visits and monitoring.

## **Certified organic supply chains: the case of Swift Co. Ltd<sup>28</sup>**

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### **Abstract**

*This article describes the relationships developed by the Swift Co. Ltd of Thailand with groups of farmers for the supply of organic-certified fresh produce. Success comes from cooperating with farmers and investing substantial amounts of time, money and human resources into their production systems, the logistics of the supply chain, traceability and quality control, and independent certification. As a result, Swift Co. Ltd is one of the leading fresh produce exporters of Thailand with a robust quality control system.*

Let me give you a brief overview of our company first. We are a Thai company, fully owned by Thais. The company was established in 1986. It was, and it still is, a very small company, but we have a big dream. From the very beginning, the mission of our company was to supply premium quality produce to our consumers, no matter where they are. Irrespective of their ethnicity, if they buy our products, they must receive premium quality produce with the highest standards of food safety the world can offer. The second driving principle is that all the parties in our supply chain or value chain, if you include the consumer, must benefit fairly from our operation.

To achieve our goals we can only operate in one way. We have to organize our own farms or grower groups. We cannot buy from the market. To have the consistency in quality and the highest standards of food safety, we have to know exactly what the farmers do on the farm, what the current farming practices are, how they can grow it and how they transport it. To achieve our objectives, we set up a contract grower groups' model. Even before we started organizing the group, we checked potential sites. We checked the history of land use. We did the risk assessment. We checked the soil conditions, water conditions. Even though we are satisfied, every year we continue to check the soil condition and water condition; twice a year, in the rainy season and in the dry season.

At present, we have only one kind of farming practice that we adopted for all our members: everyone in the group must practice GLOBALGAP. In addition to that, everyone must practice chemical-free farming; not pesticide free, but refraining from using all agrochemicals. The top of the line is organic farming, fully certified under European Union, American and Japanese standards. Here, chemical-free farming may be the same as organic farming, but it cannot be certified as such, because of some rules and regulations or requirements. Let me give you one example. If you have a small plot of land and try to comply with the requirements of organic farming to create a buffer

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<sup>28</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management

zone around your farm, if you only have one acre or one-third of a hectare, when you have a buffer zone of 20 to 25 metres around your farm, then you don't have anything left.

Our grower group is spread out throughout the country, from the north to the south of Thailand, and from the Myanma border to the Cambodian border. We organize our growers and work with them as partners, not as a buyer and seller. We work together. We solve problems together and we share the benefits equitably. When problems arise like this year when flooding was widespread, we, as the stronger party, carried the burden to solve the problem. Now all those farmers who were affected by the flooding are back on their feet. Supply will resume from the end of this month onward.

To maintain premium quality we are concerned about freshness, taste, flavour, the appearance of our product and food safety standards we employ. We have established our own packing houses to shorten the travelling time from the farms to the pack house and to save on the costs of logistics. We want to be the lowest cost player in the field. All our processing facilities are purpose built, with good manufacturing practices certification. Our processing is certified under both HACCP and British Retail Consortium.

The organic processing line and the conventional processing line are totally separated. Our supply chain operates directly from the growers to our pack house, and then to the importer, retailer and consumers. There are no additional layers: we removed them all in order to have the highest standard of food safety and to provide premium quality consistently. We diversified our grower base throughout the country for two purposes: firstly, to be in the position to serve our customers better, no matter where they are. They must have consistency of supply in terms of quality and regularity. This year is a good example. Flooding was widespread in Thailand, but we were still able to supply our customers on schedule, even although the farm areas were very badly affected.

In our business, we try to minimize waste. As you know, this is a kind of cost saving, where we are able to pass the benefits to our growers, our packing houses and onto our consumers. In Thailand, it is not unusual for fresh produce to pass through as many as 14 layers. This is very inefficient. Nobody intended it to be this way, but because of the structure of landholding, everything happened this way. We have to change this in order to survive in a very competitive world. The effect of a multilayered chain is so great that every layer adds costs and profit taking, so that by the time the product finally reaches the consumer, its value at the farm gate (US\$1) has risen to US\$7–10.

Furthermore, each time fresh produce changes hands, its quality deteriorates, so by the time it reaches the consumer, the quality is so poor and the food safety standards have all but disappeared, no matter what the farmers try to do at the farm. In this system, everyone loses. Under the supply chain we have developed, there are no layers; it is direct from the farms to our pack house. We use the same model for our organically certified chain.

We started our operation in 2001. We began with only 47 farmers in two groups, and a planted area of organic asparagus of just 15.5 hectares. These growers did not have any experience in organic farming. They didn't even know asparagus. We spent almost two

years training them. All of them, after training, signed a written contract with us, to commit their farms to organic farming. We organized them in such a way that they will be in the position to carry on even if our company, by any chance, folded up tomorrow. With regard to the training, it is not training on organic farming *per se*. For that you need continuous training. We concentrate on training in the field. Our agronomist is out there working with them all the time to provide training and on-the-spot problem solving. Then we have to do follow-up training on how to manage the group successfully on a one-man one-vote basis. They select their own leaders. They select their own management committee. In this regard they are independent. Most important is the attitude development training. It's not the technical part or the organic farming practice *per se*, but training attitudes and training the group members on how to manage themselves.

In order to make sure that everything is done right according to the framework or the kind of agreement, we have agronomists conduct internal auditing daily. Six days a week, 365 days a year, minus the weekend, one day per week, we have another independent internal auditing agronomist from the head office. In the interval of three to four months, we would conduct a kind of separate, independent auditing. If the finding of some agronomists and the agronomist from the head office is different, they have to sit in front of the committee to explain why. Before they can go out and do the internal auditing, all these people have to be trained and certified on HACCP, GLOBALGAP and to study American, European Union and Japanese organic farm principles. Each year we are certified by the companies SGS and BCS.

Although we started out as a very, very small company with big dreams, we have always operated a traceability system. We began with a manual traceability system about 15 or 16 years ago, but more recently, it has been upgraded to a bar coding system with a computerized control process. The system has been designed to meet the company's requirement to trace both backwards and forwards, accurately and efficiently. We are trying to develop it to operate in real time. Our customer can check in themselves, if they want to. However, it's not so easy to implement. For those kinds of product that can be easily bundled together, it is easy. However, for those that cannot be bundled together, you must decide on the packaging, the container, and then you can solve all the problems. The product can be traced back to a farm, a subplot, and it can trace forward to each pack if need be, but it is costly. Even although we have the capability to do it, we cannot trace each punnet back to the farm as yet, but within hours we can trace where the produce came from and who was the grower.

Intentionally, we organized two small core groups for the organic farming. The income from the organic asparagus farm compared to other produce in the province lead to our success and to fast expansion. Right now, we have 250 hectares of organic asparagus and are increasing daily. New farms are being added as they are certified. The new farms will be certified as transitional. In the beginning, our farms were certified by OMIC of Japan, but OMIC is not acceptable in the European Union, because they do not operate under ISO guidelines. So we changed to BCS. BSC can certify under European Union, Japanese as well as the American standard. All of our members, no matter whether they do conventional farming or organic farming are certified under

Option Two. Option Two means group certification. If anyone in the group fails, the whole group fails.

On the logistics of the chain, delivery and traceability, we have set up collection stations in the growing areas. Every group has its own collection station. Right after harvest they can walk from their farm to deliver their produce. Weighing, grading and everything, is done in front of them transparently. Delivery is carried out by refrigerated trucks from the collection station to the packing house every day. Labelling the produce starts at the station: crop codes and growers names are recorded.

Transportation. This is critical and quite costly, because you cannot mix the organic produce with the conventional produce in the refrigerated trucks. The container has to be separate and only used for organic produce. The truck has to be clean; the basket or container has to be cleaned every day. They immediately unload when they reach the packing house in different bays.

On the organic processing line, all the facilities have been certified by BCS. All the equipment and facilities have to be completely separate in order to prevent any mixing of the produce from the farms on the processing lines. Even the loading and unloading bays have to be separated, and operators, in our case, have different uniforms. Storage and packaging is the same thing. You have to have a different cool room for organic produce and conventional produce. Packaging is separated for the finished products. Everything has to be labelled clearly.

In the organic market, you need official approval to import to countries like the United Kingdom. You have to be approved before you can label it as organic produce. We have been approved and thus you will find our product on the shelves of the leading grocery chains in the United Kingdom. Even then, every shipment has to be accompanied with a fresh original certificate from the certifying body specifying the quantity shipped on that occasion, and this certificate must accompany the goods.

I believe we have no weak links in our supply chain, and I think we have the shortest possible chain. Supermarkets and modern retailers are not only going for quality or fair-trade, but for the cheapest price as well. To survive, the business must be really lean. You have to be a low-cost player. In our case, we have no waste. If, in our fresh line we have something that is not acceptable for our fresh line, we divert it. We have a good frozen line and we have good dehydrated lines to manage all the waste from the processing line. Eventually, we believe that in the near future, the tail will wag the dog.

So this is the core of our operation and of our supply chain, and we believe that we have one of the best. We have full control, and we can assure our consumer, our importer, and our retailers that we have the best-quality produce with the highest standard of food safety. Currently, our packing house is operating 24 hours a day. All the produce comes from our own growers under long-term contracts, but mind you, they are not tied up with us: they choose to be with us. They are independent, and every year we discuss price and bargain with them. So even if our company folds up tomorrow, they can carry on themselves independently.

DELEGATE: Are you also cooperating with other Thai exporters to Europe, because both sea and airfreight is expensive?

MR UATHAVEEKUL: Yes, we try to do that. We have organized an association of fresh produce operators. This includes not only the exporters, but every kind of operator in the fresh produce sector. We try to work together to get a lower cost for transport. In our case, we have to pay between £5–6 million for air freight alone. We ship out seven to ten times a day to various destinations in Europe, Japan, Australia, New Zealand and many other countries. The major problem is that there is not enough cargo space to go around. The demand for space is so great.



## **Performance and technological capacity in fresh produce supply chains: the balance between prescription and learning**

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### **Abstract**

*The capability to innovate is crucial for individual or allied companies to be able to compete in international markets. However, in the international markets for fresh produce, we observe a tendency to prescribe and standardize technologies and practices through the implementation of quality standards and safety regulations. This entails a strong focus on the transfer of technological fixes accompanied by prescribed practices rather than the development of innovative and resilient supply chain configurations finding solutions tailored to specific conditions and constraints. This unintended consequence of voluntary regulatory systems operational in agrifood chains may constrain companies and producers active in export-oriented supply to dovetail their competitive strategies with the competencies and resources available in their local environment. This paper describes this dilemma for a selection of performance-related tasks in fresh produce chains: solving quality problems, managing safety risks, monitoring performance, and installing traceability. The paper discusses the extent to which current modalities in horticultural chains act as configurations for innovation or whether the rules and routines unintentionally hamper socially embedded innovation. The paper uses the observed paradox between prescription and learning at farm level to challenge contemporary management styles, channel governance and institutional modalities attached to quality and safety requirements in the trade of fresh produce.*

### **Introduction**

The quality and safety requirements in cross border supply chains for fresh produce have become more strict and rigid. This is related both to public regulation, such as the European General Food Law, and private voluntary regulatory systems, such as GLOBALGAP. Increasingly, the quality requirements not only address basic food safety issues, related to the actual product, but also incorporate environmental sustainability and social welfare matters in the production processes (Vellema *et al.*, 2006).

This paper starts from the observation that, in the international markets for fresh produce, there is a tendency to prescribe and standardize technologies and practices through the implementation of quality standards and safety regulations. The question addressed in this paper is how this trend impacts on innovative capacity on the upstream side of the supply chain, particularly for primary producers supplying fresh produce. The paper examines the balance between prescribed practices and local learning in a selection of tasks apparent in supply chains: solving quality problems, managing safety risks, monitoring performance, and installing traceability. When describing these “technical” tasks the paper shifts the focus from content towards procedural and

institutional aspects of managing performance in supply chains. It observes a paradoxical situation between prescribed uniformity in farm management practices on one hand and tailor-made solutions to complex performance problems embedded in mutual learning processes on the other. Examining the supply chain tasks from the perspective of whether they can be managed differently outlines an approach to establishing good performance in supply chains grounded in local capacities and transparent negotiations and interactions between chain actors.

### **Solving quality problems**

The globalization of agrifood chains, in combination with increased attention to product quality and safety, has fostered prominent and widespread institutional changes in the trade of fresh produce. These include the rise of contractual arrangements in horticultural supply chains replacing purchase in (deregulated) spot markets (Reardon and Barret, 2000; Eaton and Shepherd 2001). Companies contracting out production have to find ways to establish quality in the fields managed and owned by independent farmers.

A study of contract farming of asparagus in the Philippines (Vellema, 2002; 2003) shows that market demand can induce hierarchical and prescriptive patterns of behaviour in the contracting company. Initially, the company contracting out asparagus production adopted a hybrid management style, leaving room for patterns of entrepreneurial, reciprocal and brokered relationships. However, complaints in the export market about declining quality levels induced a shift to an exclusive top-down approach. This coincided with clear indications of rising production costs, which encouraged the company to intervene more directly in the farming practices and to revise the management of labour intensive tasks such as weeding and harvesting. Obviously, this altered the nature of the contractual relationship leaving less autonomy to the growers. This may also be an indication that the growers did not feel comfortable with the institutional implication of the change in management style, which made them less of a partner in the business scheme.

Establishing quality in horticultural production systems is not an easy task; it depends on committed and skilful farm managers. In the contract farming case, farmers did not appreciate the change nature of the contractual relationship due to a shift to greater control by the company of tasks such as weeding and harvesting. Also the company realized that it was dependent on motivated growers and combined its shift to stricter on-farm supervision with farm management seminars inviting growers to partake in solving production puzzles. However, creating space for the farmers' diagnoses of the quality problem, an indicator of hybridity between prescription and learning, proved to be difficult. Market pressures reduced space for time-consuming mutual learning, for example through joint evaluations of trials, and induced immediate action leading to new farm management practices prescribed by the company. Some interviewed farmers mentioned that the quality problem was much more complex than the shift in farming practices suggested by the company. They wondered whether the new harvesting procedures prescribed by the company would really change the situation and thus solve the quality problem that threatened profitability of both growers and company. Moreover, the proposed shift from manual to chemical weeding, in response to rising

labour costs, was risky because of strict regulation on maximum residue limits in the export market. Nevertheless, the company favoured this trajectory, and tried to manage possible risks by taking farm management responsibilities out of the hands of growers, leading to a strong hierarchical relationship.

This case study shows how, in the case of contract farming, quality requirements in the end-markets had an effect on the working relationships between two partners in the supply chain. Although contract farming arrangements do not necessarily preclude mutual learning, fierce competition in the market for fresh asparagus did not leave much room for adopting flexible management styles to solve solving complex quality problems. Hence, the question remains; what kind of management styles and organizational procedures are best able to include different chain actors in solving complex quality and safety problems? In the next section, the Hazard Analysis and Critical Control Point (HACCP) procedure will be described to see how it manages food safety risks.

### **Managing risks**

In the food industry, HACCP has been introduced to assure food safety (Fouayzi *et al.*, 2006; Soriano *et al.*, 2002). Visscher and Vellema (2007; Hambrecht *et al.*, 2005) analysed the evolution of the HACCP protocols with an interest in sustainability in commodity chains. They appreciate in HACCP the idea that problems can be managed through a process of self-control and monitoring and through clear procedures that encourage embedded learning and problem solving. Although the sustainability of the primary production process entails a less focused point of control, because it includes multiple dimensions (social, environmental and economic) and scales (field, farm, community), the procedural and institutional aspects of implementing HACCP can still inform the upscaling processes of monitoring quality and sustainability.

The original idea of a HACCP system was to encourage learning and monitoring by the organization itself. A central element of the HACCP approach is its reliance on the managerial and technological capacity of an individual organization to handle hazards or dangers. Accordingly, HACCP requires the presence of learning and correction capacity inside an individual company for achieving food safety objectives. In principle, it is up to the individual company to decide how to achieve these objectives, as long as the company is “in control”.

The latter appeared to be one of the major hurdles in implementing effective HACCP systems. Wilkinson and Wheelock (2004) observed the difficulty for companies to determine the significant hazards and the proper control points, which is the basis for a good HACCP system. Implementing HACCP appeared to be more complicated in the case of small- and medium-scale enterprises, connected in a layered supply chain.

To tackle the problems of scale and variety in food manufacturing, government and industry in the Netherlands developed standardized hygiene codes for different sectors in the food chain (VWA, 2005). These codes are officially approved by the government and define specific critical control points for individual products and supply chains; they are regularly revised. If a company complies with the code, it complies with the

law. These uniform and generic requirements were also meant to overcome difficulties in the governmental inspections of the HACCP system (De Sitter and van de Haar, 1998) and to ensure compliance with the criteria of the Global Food Safety Initiative. Consequently, the focus in managing food safety shifted from monitoring operational procedures inside the company to assessing the actual public health impact at the far end of the chain; e.g. setting a food safety objective specifying the level of the pathogen that can be consumed without an unacceptable impact on public health at the population level (Gorris, 2005).

The involvement of numerous small producers and processors in the mainstream supply chain of fresh fruit and vegetables suggests a parallel with unintended outcomes for small and medium enterprises in the food manufacturing industry: uniform and prescriptive food safety guidelines. Difficulties in meeting hard targets for food safety and quality undermined the credibility of the procedural verification of management systems based on the HACCP principles. Visscher and Vellema (2007) show that the interaction between the HACCP approach and public regulation resulted in a strong incorporation of the HACCP guidelines into generic regulations and laws on food safety, accompanied by the development of sector-specific hygiene codes.

The above suggests a shift from an autonomous HACCP approach, based on a selection of procedural principles guiding behaviour inside a company, to an integrated risk-based approach with more thorough control of potentially hazardous effects. The result is a shift from process guidelines to generic performance norms, with a stronger role for regulatory agencies and mandatory practices. The institutional implication is a change from decentralized forms of self control, combining self assessment and diagnosis with situation specific corrective measures, to a more integrated and centralized governance system, largely relying on uniform and expert-based practices. Yet, the original design of HACCP may still inspire a search for a feasible balance between these two modalities. Like in the contract farming case, the development of HACCP implementation also shows that specific managerial choices have been made in managing food safety risks, and the suggestion of this paper is to reflect the impact these choices have on the viability of working relationships in the chain. The next section elaborates on this dilemma by looking into the way performance is measured.

### **Monitoring performance**

Private standards and certification procedures, like GLOBALGAP or BRC, play an increasingly important role in the cross-border trade of agricultural and food products. Usually, these voluntary regulatory systems are motivated by concerns and considerations in the OECD consumer markets about food safety and the environmental impact of agricultural production. These private standards introduced good agricultural standards, usually for specific product groups, such as fresh fruit and vegetables. The prescribed agricultural practices demonstrate an improvement direction to producers. However, the practice of monitoring and certification accompanying these standards may contradict the intended learning process. The implementation of performance standards in supply chains often goes together with outside expert assessment against preset indicators, using standardized procedures and tools to secure accountability and transparency (IDS, 1998). This may be a hindrance for learning in the field, because

producers and supporting services are tempted to pay most attention to following rules or complying to set guidelines rather than to finding tailor-made solutions to complex problems related to food safety, quality or sustainability.

Monitoring embedded processes of certification often serves the purpose of determining whether a specific producer or an association of producers complies with a given set of rules or standardized practices. The “measured performance” informs the decision whether to buy or not. In this sense, monitoring systems act as an “exclusive” system, capable of including or excluding producers from the market and providing traders and companies with a legitimate way of controlling the quality of products and production processes. The question is whether monitoring can be done in such a way that it both realizes accountability throughout the chain and enhances learning.

Jansen (2007) distinguishes two basic types of monitoring: compliance and result-based monitoring. The former is defined as checking whether the realized use of inputs, implementation of activities and production of outputs (i.e. products and services from activities, such as number of teachers hired) corresponds with planning (Binnendijk, 2000). The latter relates to measuring outcomes (i.e. improvement in performance of beneficiaries) and impacts (i.e. contribution to reaching goals) from activities and inputs (Kusek and Rist, 2004). The distinction between compliance and result-based monitoring relates to the level of control an individual or organization has over the subject of measurement or verification. Compliance monitoring deals with areas in which a practice or other intervention has a relatively high level of control and it can be used for measuring efficiency of a project. Result-based monitoring focuses on areas in which the outcomes of a certain practice or intervention is also dependent on external factors. Information on outcomes can be used to indicate the effectiveness of a practice or intervention at different scales in time, space and populations (Watson *et al.*, 2004). Accordingly, result-based indicators address complex technical or institutional processes, with no certain outcomes. Furthermore, there may be interdependencies and synergies producing the actual outcomes. This analytical complexity may offer an explanation for the common use of compliance indicators in monitoring processes in cross-border agrifood chains, which looks easier and more straightforward. Checking agreed-upon rules is relatively easy for auditors. These rules also provide farmers and processors with clear guidelines on how to adapt their practices into what certifiers consider as quality or sustainability. With compliance monitoring, however, it will be more difficult to install learning processes capacitating users – the subjects of monitoring – to cope with changes, and to diagnose and find solutions to persistent problems (Clay, 2005). Likewise, compliance monitoring may entail a loss of ownership, (Vogl *et al.*, 2005).

A combined approach to verification and learning may boil down to a monitoring system intended to track progress rather than check compliance with preset standards (Booth and Lucas, 2002). In this sense, indicators used in monitoring are carriers of information representing approximations of complex processes, events or developments. Their immediate measurable quality or value indicates a state of affairs of larger phenomenon (Guijt, 2000), which is particularly relevant for understanding performance in terms of sustainability. Accordingly, the recorded and documented information is subject to interpretation and therefore instrumental in learning processes.

The bias to compliance monitoring hampers building innovative capacity, which is seen as one of the crucial factors in ensuring a sustained impact on adaptive capacity of farmers to meet demands from the market and changes in their environment (Burns and Blowfield, 2000; Heemskerk and Wennink, 2004; Marsden and Smith, 2005).

### **Installing traceability**

The previous section discusses a new mode of monitoring for establishing good, or better, agricultural practices. This discussion is also motivated by the concern that the bias to compliance may induce a sole preference to short supply chains, involving direct buying with preferred suppliers. This model contradicts with another reality in agrifood chains, which are layered and incorporate distributed producers and a variety of intermediary functions performed by different actors. A challenge for agribusiness and food industries is to find managerial strategies and business model that fit this reality. In this section we use the task of installing traceability to elaborate on this challenge.

Ensuring traceability has become an important element in cross-border trade, asked for by traders and retailers and recently anchored in the European General Food Law. The technologies used for this purpose are often based on applications of information technologies used in OECD countries: the use of barcodes and more recently, the introduction of RFID (Radio Frequency Identification) tags. The use of these technologies is closely linked with the issue of liability in case of problems with the safety of food products: it allows tracing the responsible actor. The trend in cross-border supply chains is to prescribe these technological fixes, as a condition for accessing markets and thus as a mean for arranging liability. However, how does this serve the aim of continuous improvement, which is related to installing feed back mechanisms that encourage learning and selection of the right corrective measures?

The way traceability is arranged in fresh produce supply chains often reflects strong dependence on perfect conditions and reliable, consistent chain relationships, which may fail under the persistent constraints smallholder producers operate under. The intervention logic reflects a bias to constructing a new environment, using fixed technological packages, rather than using socially embedded business models starting from constraints of low-income farmers for reengineering current practices. The so-called Bottom of the Pyramid approach (Prahalad, 2006; Prahalad and Hart, 2002), challenges this mode of operation by proposing to perceive producers in the upstream part of the chain as customers for tailor-made technologies and services rather than as passive adapters of fixed technological recipes. This argument places traceability in a more general strategy for making information accessible to low-income farmers and consequently changes the conditions for information exchange and feed back in supply chains.

A case study in the Indian soy chain (Annamalai and Rao, 2003) shows how a trading house used information technology to reengineer procurement practices, involving the activities of aggregation of volumes and quality control that can also be found in fresh produce supply chains. In this scheme, a local farmer operates an information centre linked to the internet in his village. This centre was linked to numerous transactions in the chain such as weighing, grading, or pricing. The access to information on

technology and markets supported the integration of farmers into the supply chain and resulted in a sustainable commercial engagement by providing a viable procurement practice. The viability was related to the opportunities the information centre offered for obtaining knowledge about weather conditions, for articulating crop-specific interventions the trading house might be able to provide, and for communicating information, making the price–quality relationship transparent. The trading house used the philosophy of modular increments acknowledging the specific conditions in the villages and the trading system. In this sense, it was reengineering rather than reconstructing procurement practices, and, consequently opened the opportunity of dovetailing technological interventions with the needs of farmers. This approach adopted in the Indian soybean chain built new networks and created trust among the actors in the commodity chain, and, accordingly, embedded innovation in new business models and management strategies (Vellema and Danse, 2007). It also suggests that promoting socially-embedded technological services improves the nature of the relationships between actors in the chain and, consequently, encourages transparent transactions between commercial partners.

### **Conclusions**

The performance-related tasks discussed in the previous sections show that the demand for safety and quality in fresh produce supply chains creates an institutional paradox between prescription and learning. The paper suggests that in managing performance in fresh produce supply chains, the institutional arrangements either tend to disperse responsibilities or to concentrate them (Booth and Lucas, 2002). In international food trade, responsibilities for performance are increasingly decentralized under the umbrella of, for example, voluntary regulatory systems or contract farming arrangements. Simultaneously, however, buyers want to ensure compliance with performance requirements through strict and hierarchical modes of control. For example, a buying company may wish to monitor generic performance criteria to enhance its public accountability, and equally relies, for establishing quality, on the capacity of a contracted farmers' group to use information to adapt generic practices to specific agro-ecological and social conditions. This paper suggests that the institutional paradox is not a problem; a certain hybridity may even enhance the viability of cooperation as well as technological capacity in a supply chain. It becomes problematic when the institutional outcome of quality requirements in cross-border agrifood chains is biased towards one side of the paradox, leading to unidirectional technology transfer and the adoption of prescribed practices. This trend may contrast with the development of learning and innovative capacity in the upstream side of supply chains for fresh produce.

Thus, the question raised in this paper is whether a more hybrid structure, including different institutional modalities, may enhance viability of fresh produce chains as well as their innovative capacity. Hence, the managerial choice is not limited to selecting one exclusive modality; it may be more effective to find the right blend and to take the opportunity to build on existing social practices. This perspective proposes an open-ended view to tailoring solutions to local conditions and avoids generic solutions to complex performance problems. It also puts forward a result-based approach to monitoring; informing embedded learning processes, possibly in combination with a risk-based certification scheme looking into the learning and management capacities of

independent firms or (associated) producers. Finally, the paper introduced the idea of a new model for linking compliance with traceability requirements with offering technological innovations to low-income purchasers on the upstream side of supply chains.

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## **GAP, market access, farmers and field realities: making the connection through better farmer education in integrated production and pest management<sup>29</sup>**

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### **Abstract**

*Globalization and freer trade have increased trade in fresh vegetables in Asia in recent years. Consumer demands and emergence of supermarkets are driving demands for quality assurances for food safety. Governments in Asia have initiated programmes to promote good agricultural practices (GAP) among its millions of smallholder fresh vegetable farmers producing for both domestic and export markets. Nevertheless, in many parts of Asia, farmers continue to rely heavily on inputs of agrochemicals, particularly pesticides, to produce their horticultural crops. Results in terms of real on-farm reduction of agrochemicals have so far been limited. Governments increasingly realize that real change has to originate from farmers making better decisions on what crop production and protection strategies to use to limit inputs of pesticides. GAP programmes stand to benefit from strengthening farmer education efforts and better farmer access to novel options for pest management. Vice versa, farmers trained in the application of integrated production and pest management practices through government farmer education programmes in Asia stand to gain from better functional linkages to GAP programmes for better market access. This presentation aims to explore such functional linkages for real on-farm reductions in the use of agrochemicals as to induce farmers to produce safer fresh vegetables for both domestic and export markets.*

I am going to talk about good agriculture programmes (GAPs), market access, farmers and field realities here in Asia, and try to make some suggestions for improvement through better education and better integration of production and pest management.

We have had many presentations over the last few days demonstrating the huge impact that globalization has had on the fresh produce industry. Small-scale farmers in Thailand, the Philippines and elsewhere in the region are basically being pushed out of production as a result of cheap imports from the People's Republic of China. Furthermore, the influence of the retail sector is having a big impact on food safety systems. Food safety concerns, quality assurance systems and GAP protocols are being put in place all around the region.

Integrated pest management (IPM) is the standard crop protection policy throughout much of Asia these days. Pesticide-regulated frameworks have been strengthened and

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residue analysis facilities are being developed. National IPM farmer education programmes are in place to support quality assurance. At the same time, new options for pest management are becoming increasingly available and utilized. This includes biocontrol options, biopesticides, better use of introduced parasitoids and natural enemies and, increasingly, improved seed technology. Yet the majority of small-scale farmers continue to rely exclusively on the use of toxic pesticides. In Bangladesh, for example, farmers can spray up to 80 times a season to control fruit and shoot borer.

Farmer pesticide poisoning in Asia is widespread and generally under-reported. Farmers don't go to hospitals when they fall sick from pesticide poisoning. Widespread environmental pollution and the adverse impact of chemicals on the natural resources are raising concerns about food safety in Asia. This is an issue for domestic consumers, but it also poses serious trade impediments for those who want to export. In Asia, the consumption of pesticides is huge and rising. On an annual basis, 790 000 tonnes of pesticides are applied worth an estimated US\$8.3 billion.

Cambodia is a country that has absolutely no capacity and capability to control imports. It's a place for dumping. Instructions on pesticides are often in foreign languages: products are dumped on the market with Vietnamese and Thai labels. Neither merchants nor farmers can read the labels, if they can read at all. There is limited training and certification of pesticide merchants and small traders, and farmers have little knowledge on pest management, which brings us to the obvious conclusion that throughout much of Asia, particularly in countries like the Lao People's Democratic Republic and Cambodia, you cannot speak of safe use of pesticides.

That provides the rationale for why FAO is implementing programmes to train farmers to reduce the on-farm use of pesticides in this part of Asia. The programme seeks to address the rampant misuse and overuse of pesticides. The programme is focused on the Greater Mekong Sub-Region that includes Viet Nam, the Lao People's Democratic Republic, Cambodia, Thailand and the southern part of the People's Republic of China. The task of the programme is to provide technical support to governments and associated public and private sector partners in order to develop strong vegetable training programmes for farmers. These programmes carry out applied research extension and farmer education. They focus on the development and application of integrated pest management practices for fresh vegetable crops. The standard education approach we use in our work is based on the farmer field school approach.

The primary learning approach that we use in our work in educating farmers is schools without walls. All training happens directly in the field. Farmers learn about ecology and pest management from seed to harvest. We generally use a group approach aimed at community development, finding better ways to organize farmers around issues of plant protection and production. New schools aim to help farmers produce safer vegetables and reduce the inputs of pesticides. Typically there are no yield reductions and farmers achieve higher profits.

The governing principle of the farmer field school is to grow a healthy crop. If a farmer knows how to grow a healthy crop, he can do away with most of his pesticides. Regular

field monitoring is the key: a farmer needs to go into the field and observe what the threats are. Optimal use of conservation and natural biocontrol is encouraged.

As farmers need to make daily decisions on their farm, the farmer needs to be an expert, and that means education. All training uses adult education approaches: learning by discovery, learning through experimentation and active fieldwork. For example, throughout much of Asia, diamond-backed moth is a major trigger for pesticide applications. Conventionally, farmers spray about 10 to 15 times per season. If you apply IPM, or if you use classical biocontrol, there is no need at all for toxic pesticides and, at times, maybe one or two applications of biopesticides.

In relation to GAP, and particularly GLOBALGAP, these programmes are very biased towards pesticide applications. In its introduction section one can read that “GLOBALGAP is a means of incorporating IPM and integrated crop management (ICM) practices within the framework of commercial agricultural production. Adoption of IPM and ICM, is regarded by GLOBALGAP members as essential for the long-term improvement and sustainability of agricultural production”. So GAP is basically about avoiding pesticide residues. Farmers need to know, therefore, what to do and how to do it. This requires training and access to inputs such as pest-resistant varieties and biopesticides. Yet, if we look at GLOBALGAP in terms of the crop protection sections, of the 64 control points, only two refer to IPM. When we look at these two control points, they are highly vague and flexible, and they are not a major must. The basic point I am making here is that GLOBALGAP is, in our opinion, not looking closely enough at the alternatives that are available to farmers to avoid the use of pesticides.

ASEAN GAP is a newer initiative. Its purpose is to develop standards and harmonize GAP programmes across the ASEAN region. It is not a certification system, but it does impose standards and it does seek to harmonize the many GAP standards that now exist within the region. The scope covers production, harvesting, farm purchasing and post-harvest handling for fresh fruit and vegetables. If we look at the IPM quality control points, there are basically four sections in the ASEAN GAP. It deals with food safety, environmental management, workers' welfare, occupational health and safety, and product quality. Within ASEAN GAP there is a lot more attention to the alternatives for crop protection.

Finally, I want to explore some functional linkages between national GAP and IPM farmer education programmes. Of course, this distinction is a bit dubious, because basically IPM programmes are GAP programmes. It is important to realize that GAP is taking over as a major mainstream investment by governments setting standards and forgetting that they actually have IPM programmes in place that they need to connect to and make use of. Some examples of where these connections are being used: in the southern part of the People's Republic of China, vegetable farmers are actively connected to green food marketing chains. Viet Nam is investing heavily in safe vegetable programmes and actually using IPM farmer field school models as training models in their programmes. In Thailand, the experience is also very interesting in terms of how IPM farmers were connected to GAP schemes and to the organic Royal Project marketing chain.

There are a lot of opportunities for GAP and IPM programmes to be integrated in Asia. There are opportunities for organized communities of IPM farmers who know how to reduce on-farm use of pesticides to apply for GAP certification. For these farming communities, there is improved market access, but the risk nevertheless remains of most small-scale farmers becoming increasingly marginalized.

The challenges: do farmers implement GAP for export or for domestic markets? What are you really aiming at: an export or domestic market? Should your GAP standards be different and your programmes different in terms of how to address these issues?

Quality control of farmer education is a huge problem. We are seeing that in Thailand. We are seeing that in Viet Nam. Training often resorts back to filling out forms instead of going into the field to learn actively how to reduce pesticides.

There is also a paradox. In these difficult times of very rapid change in the vegetable industry, farmers need to be innovative and creative, yet, at the same time, GAP seems to be pushing farmers to follow instructions and protocols. The challenge is for curriculum development. Food safety, post-harvest techniques, record keeping: these are modules that still have to be developed and clearly linked with IPM programmes.

Setting realistic targets. I want to close with that. You cannot train millions and millions of farmers in GAP or IPM overnight. In Thailand, the government is learning the lesson and trying to make sure that there is a better training approach to GAP.

DELEGATE: I am thinking about your last point. Talking to business people, farmer field schools are considered to be a very expensive way of educating farmers. Can you speculate how supply chains may offer an organizational approach in which you can encourage learning and an exchange of information for which the actors in the supply chain are prepared to pay?

MR KETELAAR: It is important to realize that most GAP protocols are very much focused on withdrawal periods. You stop spraying for say two weeks before harvest. Never mind what happens before that! It is important to ensure that in GAP protocols you pay attention to what happens throughout the season and to make sure that there are incentives for farmers to take the reduction of pesticides seriously.

DELEGATE: What I wish to say is not a question, but an observation. At the beginning of the week, Peter Batt described that we are moving from a supply push to changes which are reflected by demand pull. This project is trying to encourage the small farmers to improve their production practices. Is this not a supply push? Hence I was wondering why there is not more focus on training the consumers, because if we tell them what poisons they are eating, that will change their perception and we will get the demand pull. Then these small farmers will have a much stronger incentive to produce cleaner and safer produce.

MR KETELAAR: Good point. As a future part of our programme, public awareness campaigns will definitely play a major role. However, I don't think it should be the role of FAO; it should be done in partnership with others. For example, the Pesticide Action

Network is extremely efficient and with a huge outreach here in Asia and at a global level.

DELEGATE: I would like to clarify a point. We have just heard some of the problems that arise from following GLOBALGAP and a prescription approach and the problems that arise from that; perhaps even a greater reliance on pesticides. Yet, we heard from Tesco Lotus that the pesticide residues in their suppliers' base have gone down in terms of their detection from 11 percent to 2 percent to 0 percent over the last three years. Is there not some message in there between the sort of retail pull and what is happening with those contracted suppliers, and what is happening in the rest of the market?

MR KETELAAR: Most definitely. I personally encourage collaboration with the private sector. We have initiatives going on in various parts of the world to look at more effective and efficient ways of engaging with the private sector. It is always a tricky sector to work with though, given that it is so dominated by the pesticide industry. There are a lot of lessons to be learned in Thailand, for example, where very successful initiatives have worked under contract farming conditions to reduce the on-farm use of pesticides.

## **Strengthening the capacity of farmers' groups to enhance quality through organic certification: a case study of cashew nut producers in Flores, East Nusa Tenggara, Indonesia**

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### **Abstract**

*Cashew is a major source of income for most farmers in Flores, an island of East Nusa Tenggara Province of Indonesia. Most of the cashew are grown organically and sold in shell (gelondongan) to traders who frequent the farmers' villages. The price of cashew in shell is considerably lower than the price for nuts in either a fresh or processed form. With the aim of enhancing the competitiveness of selected farmers' groups and local producers through value adding, two international non-government organizations (NGOs), in collaboration with two local NGOs embarked on a project to certify selected farmers' groups in Flores for organics. The project focused on the organic certification process, as managed by the farmer group themselves, and capacity building in terms of collective marketing and cashew processing. The paper describes how VECO Indonesia, a Belgium NGO and Swisscontact, a private sector-funded Swiss development agency, collaborated with two Indonesian NGOs – Bangwita and YMTM – to enhance the capacity of selected farmers' groups to add value to their produce. While not without its share of problems, the project led to an enhanced understanding by the farmers and the NGOs of the certification process and the required documentation. More importantly all four participating farmers' groups received organic certification in accordance with standards from the American National Organic Programme (NOP), the European Union and Bio Suisse (Switzerland). An added outcome of the project was that farmers' groups became more aware of sustainable land management practices. The market-linking process is still a challenge that the project collaborators have to deal with. Lessons learned, both technical and institutional, now serve as a basis for planning future activities.*

### **Introduction**

Organic farming is growing worldwide. The total land area under certified production has reached 25 million hectares (Gier, 2004). In 2003, worldwide sales of organic products reached US\$23 billion. The world's biggest markets for organic products are the United States of America (US\$11–13 billion) and Europe (US\$10–11 billion). Britain's largest trader in organic products estimates that the market will grow to US\$100 billion within the next ten years, with most of this growth taking place in the United States of America, Europe and Japan.

For export, organic certification adds a great deal of value (Scialabba and Hattam, 2002). Organic certification not only provides consumers with a guarantee of quality, but it also gives farmers the opportunity to obtain premium prices. However, most consumers will pay a premium only to a certain point. As the premium increases, the



number of consumers willing to pay decreases, mainly because the conventional commodity is always available as a substitute.

In Indonesia, the market for organic products is growing too, especially in major cities. Indonesia's main organic products are rice, fruit and vegetables, coffee, cashew nuts, spices, coconut oil and shrimp. According to Prawoto (2005), organic coffee, cashew nuts and shrimp from Indonesia are exported to Europe, the United States of America and Japan.

The majority of Indonesia's cashew is produced on the island of Flores in East Nusa Tenggara province. Based on the area, the province of East Nusa Tenggara is the largest area for cashew nut production, with 23 percent of the country's area under cashew (Dipokusumo, 2004). In the districts of East Flores, Sikka, Ngada, Ende and Manggarai, the total land under cashew nut production has reached around 90 570 hectares. The cashew nuts produced are typically sold unprocessed and ungraded to processors from India and local traders. The farmers usually just dry the nuts on the ground for a short period (about one day) and do not segregate the nuts by size.

This paper will discuss the experience of developing organic cashew nut production in four villages in Flores based on the joint project between VECO Indonesia and Swisscontact. Flores is a natural area for organic production as the farmers do not use chemical fertilizers or pesticides. Much of the discussion in this paper is drawn from the results of the project over the years 2005 and 2006.

### **Objectives**

The project aimed to help farmers optimize the potential for cashew nuts in Flores through organic certification while maintaining a low input system of production. The specific objective was to create a learning process for farmers, VECO Indonesia and Swisscontact through: (i) arranging organic certification of cashew nuts through farmers' groups; (ii) introducing internal control systems (ICS); (iii) building the capacity of farmers' groups to market organic cashew nuts; and (iv) building the capacity of farmers in processing cashew nuts to increase the added value. Organic certification was viewed not only as a means of securing better markets, but also as a means to improve product quality in the long term.

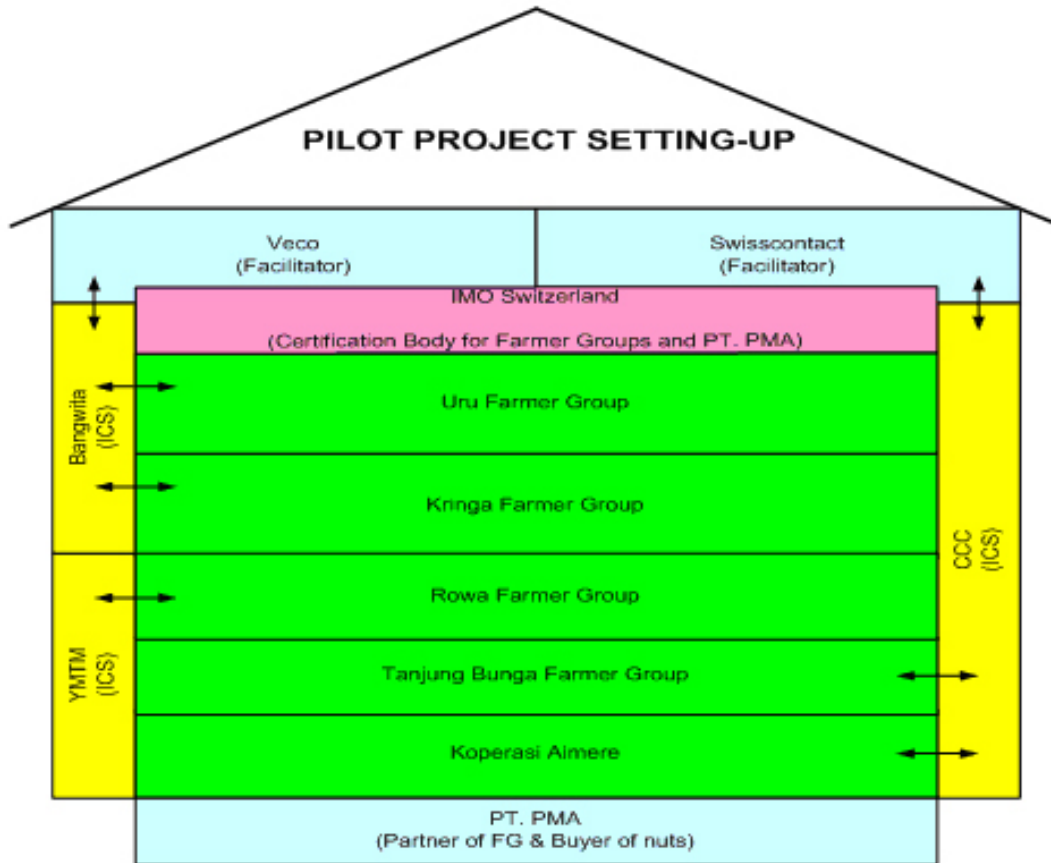
### **Project methodology**

#### **Project design**

The multistakeholder organic cashew nut certification project officially began in 2005. It involved farmers' groups, local NGOs, private sector traders, Swisscontact and VECO Indonesia. The local NGOs involved were YMTM and Bangwita, VECO Indonesia partners with much experience on farmer empowerment.

The organic certification process was undertaken in cooperation with the Swiss-based International Marketecology (IMO). The set up of the pilot project between VECO Indonesia, Swisscontact and IMO, and various other institutions such as PT PMA, NGOs and farmers' groups in Flores is shown in Figure 1.

**Figure 1: Setup of the pilot project for organic certification of cashew nuts**



The roles of each of the stakeholders in this project were as follows:

- the farmers' groups involved were from four locations (Rowa, Ilin Medo, Kringa and Ilepadung);
- IMO is an international institution that provided international certification according to Regulation (EEC) No 2092/91 for organic production;
- the Consulting Cashew Centre (CCC) assisted in implementing internal control systems (ICS), especially in Ilepadung, where no local NGO was involved;
- PT PMA, a private company, purchased the farmers' organic cashew nuts;
- local NGOs (YMTM and Bangwita) provided support to the farmers' groups in the form of technical assistance in sustainable agriculture and capacity building. In the organic certification process, YMTM and Bangwita served as the ICS provider (local ICS coordinator), facilitating coordination of the local inspectors in documenting and monitoring processes in the field;
- VECO Indonesia and Swisscontact facilitated and supported project implementation as well as forged links or networks with all stakeholders, including traders and the IMO.

### **Selection of the project location**

The project covered four villages in three districts of Flores, namely: Rowa (Ngada district), Kringa and Ilin Medo (Sikka district) and Ilepadung (Flores Timur district). These locations were selected on the basis of the potential for organic cashew nut production as a result of; (i) a preassessment study which determined the potential for the development of organic cashew nuts in Flores; and (ii) the PT PMA study in 2004 which explored the potential and challenges of the cashew nut and vanilla business in five districts in Flores.

### **Project stages**

In keeping with its objectives, the project involved several stages of activity:

**Selection and verification of farmers' groups:** Based on the results of the preassessment of the risk of contamination (fertilizer, pesticide and surrounding lands), four villages were selected as suitable for involvement in the pilot project. From these four villages, a total of 561 farmers were involved.

**Assessment:** A joint team from IMO, YMTM, Bangwita, Swisscontact and VECO Indonesia conducted a field assessment of the selected locations. Results indicated that the land in Flores was in reasonable condition for the cultivation of organic cashew. The farming systems developed by the farmers typically feature low external inputs. Chemical fertilizers and pesticides were not used. However, the assessment also indicated that there were no existing farmers' groups capable of providing continuous internal control for the development of organic farming enterprises. For this reason, the need arose to strengthen farmers' capacity to undertake internal control as required by an internal control system (ICS).

**Selection of local inspectors (local ICS):** In the organic certification process, at the farmer group level, there was a need for an internal system to be set up that functions as a documented control system. The ICS is more than just a "control system", because ICS is an overall quality management system for the farmers' groups. ICS is a must if organic products are to meet the standards required for organic certification.

Local inspectors were recommended by the groups and they were selected jointly by YMTM, Bangwita, Swisscontact and VECO Indonesia. Most of those selected as local inspectors were farmer cadres with field experience and knowledge of organic farming.

**ICS training:** To introduce ICS and its role in the organic certification process, ICS training was given for the first time in October 2004, facilitated directly by IMO. Representatives of the farmers' groups, ICS providers (YMTM and Bangwita) and local government participated in the training. The level of participation and motivation of the training participants were found sufficient enough to begin developing internal organic standards for cashew nuts produced in Flores based on the IFOAM (International Federation of Organic Agriculture Movements) standards used by IMO.

**Preinspection by local inspectors:** A preliminary inspection was carried out by local inspectors together with the ICS provider to initiate implementation of the ICS. This stage included awareness-raising for farmers on the benefits of organic farming and organic certification. Farmer members of organic groups were involved as they needed

to give their approval of the contract made by the group members, internal inspectors and the coordinator (ICS provider).

The local inspectors inspected the lands of all group members. The resultant data was then cross-checked by the external inspector. During the inspection process, the local inspector also offered advice on the technical aspects of organic soil management and raised farmers' awareness of the benefits of organic soil management.

**International inspection by IMO:** The internal inspections by the local inspectors were followed up by international inspections by IMO in May and June 2005. The aim was to verify the data and evaluate the performance of the ICS providers and local inspectors. On the basis of having met the standards, the cashew nut farmers were awarded international organic certification. These certificates are owned by the farmers' groups.

**Building a marketing network:** From the outset, Swisscontact and VECO Indonesia had agreed that the organic cashew nuts produced by the project would be purchased by PT PMA. However, these two organizations were also actively networking with several other Indonesian and foreign traders and buyers via e-mail and direct contact. The aim was to build a network of potential buyers for the long-term marketing of organic cashew nuts.

**Monitoring and evaluation:** To determine progress towards the project outcomes, regular monitoring and evaluation was carried out by VECO Indonesia and Swisscontact programme officers. This involved undertaking field visits to the farmers, the ICS providers and local inspectors, as well as intensive meetings between VECO Indonesia and Swisscontact. The aim was to identify and discuss progress and problems arising in the field to improve the project further.

As organic cashew certification was a first for VECO Indonesia, Swisscontact, the local NGOs and farmers in Flores, an in-depth evaluation was made at the end of the first year to reflect on the challenges faced. This self-reflection involved all project stakeholders. The results of the self-reflection were used as inputs for the project's planning for the second year.

## Results

### **The role of the ICS in the organic certification process**

The organic certification process requires a quality control mechanism to ensure that farming practices, products and processes are organic. In the case of this project, a control system known as the Internal Control System (ICS) was introduced and this was implemented by IMO. Control processes were implemented on a regular basis to assess whether the organic cashew nut production processes in the field met the standards and were properly documented.

From the four farmers' groups, 31 local inspectors were selected to perform the internal control, broken down as follows: ten from Rowa, eight from Ilin Medo, six from Kringa and seven from Ilepadung. In terms of documenting the local inspection activity,

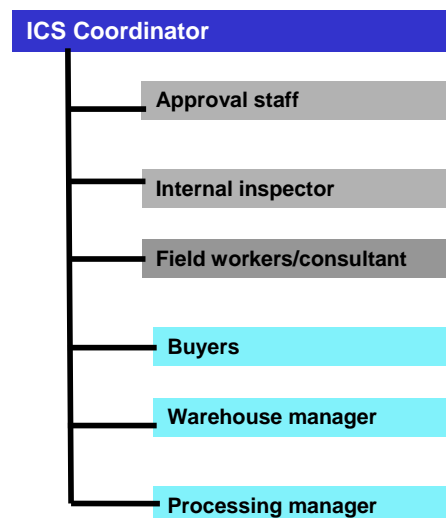
YMTM and Bangwita helped the local inspectors, as ICS providers, to remind the farmers to make detailed records.

In keeping with the principles of ICS, the roles and responsibilities undertaken by the internal inspectors in the process of organic certification for cashew nuts are defined as follows:

- plan inspection visits to each location;
- prepare or inform farmers of inspection dates;
- ensure that all relevant ICS documents on the farmers (from the ICS manager) are available for inspection;
- ensure that all relevant forms are available for inspection;
- arrange transport, for example for field visits (or the ICS coordinator does this);
- perform inspections of the group members' land;
- report inspection findings to the ICS provider for documentation.

The ICS work structure is illustrated in Figure 2.

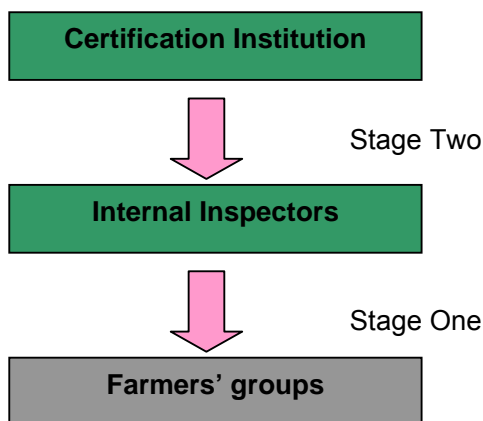
**Figure 2: ICS work structure**



The ICS control mechanism for this project involved two stages. Stage One is the internal inspection by local inspectors coordinated by the ICS provider. This stage involves the registration of organic cashew nut farmers, gathering data on land area, number of trees, estimated total production and how organic the land is in accordance with the standard set by IMO. The results of this internal inspection were then sent to IMO for verification. Stage Two involved a field inspection by IMO to verify the information and data gathered by the local inspectors. If they qualify, based on the results of this inspection, IMO will issue organic certification to the farmer group, along with a list of the names of the members of the group that has been registered. If they do

not qualify, they do not get the certificate. However, reinspection is still an opportunity. The ICS control mechanism is illustrated in Figure 3 below.

**Figure 3: ICS control mechanism**



#### **The role of farmers' groups in the development of organic cashew nuts**

The project partners worked through farmers' groups to attain the objectives of enabling farmers to produce cashew nuts with an organic certification, to implement the ICS, to minimize inspection and certification costs by sharing the costs, and to develop collective trading to improve the farmers' bargaining power. Farmers' groups play a key role in the organic certification process. Moreover, certificates are held by the smallholders' groups, not by individual farmers.

Each of the four farmers' groups have their own respective administrative structures and rules. Each of the groups was further divided into three or four subgroups based on geographic location or administrative boundaries. From each of these subgroups, one or two members were chosen to be local inspectors (local ICS), whose role was to undertake the documentation and to control organic farmers in line with the ICS work system.

To build the capacity of the farmers' groups in the institutional and technical aspects of production, training and peer visits were conducted. The training provided included institutional strengthening of groups (including group dynamics, farming analysis, etc.), management and processing of organic cashew nuts (including grading, sorting, drying and storage), and processing cashew into shelled cashew nuts.

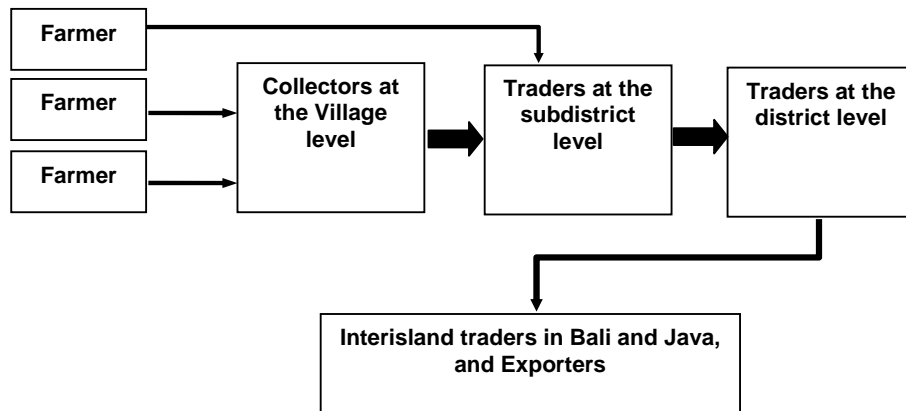
#### **The Flores cashew nut marketing chains: conventional versus organic chain**

The marketing chain for unprocessed cashew nuts in Flores generally involves four actors: farmers (producers), collectors, traders at the district level, and buyers from India who provide the links to the international market. Specifically, the actors of this conventional chain are:

- Collectors at the village level (individuals);

- Traders at the subdistrict level;
- Traders at the district level;
- Interisland and interdistrict traders in Flores;
- Exporters in Flores and Surabaya (Figure 4).

**Figure 4: The marketing flow of cashew nuts in Flores**



Source: Gamper (2005)

The organic cashew nut marketing chain developed by this project consists of the farmers, PT PMA/CCC and Flores Farm. According to Wheatley *et al.* (2006), this chain is separate and different from the conventional marketing chain. In 2005, the first year's sales of organic cashew nuts amounted to 60 tonnes. However, exports of conventional cashew nuts from Flores were estimated at 70 000 tonnes.

The organic marketing chain was developed for two main reasons. Organic certification will add value and provide a higher price compared to the unprocessed cashew nut. Furthermore, collective marketing was considered to provide greater returns to farmers. However, the organic chain requires certification, and without it, little or no price premiums will be achieved. The price premiums achieved support the capacity building of farmers.

### **Price of cashew nuts**

The price of unprocessed cashew nuts fluctuates, depending upon market trends. The price per kilogram of unprocessed cashew nuts purchased from farmers ranges between Rp5 000 and Rp6 000. There is a downward year-on-year trend in the price of unprocessed cashew nuts. Collectors in the villages pay cash for unprocessed cashew nuts. Some employ a system known as *ijon*, where the farmer receives the money before the harvest. The long cashew nut marketing chain means that farmers receive a low price.

According to Scialabba and Hattam (2002), price premiums compensate farmers for the additional handling expenses and administrative, inspection and certification fees. The premium price was calculated to cover the cost of certification as well as the local ICS fee. A price premium was also given to maintain the sustainability of organic marketing.

The premium prices per kilogram received for the organic cashew nuts from the project in the first two years of the project are described as follows:

**The first year (2005).** For the first year, PT PMA was the buyer agreed for the project. The price at the farmer level was Rp7 500 per kg but PT PMA agreed to buy at Rp8 200 per kg. The additional benefit of Rp700 per kg was to be used to pay for the cost of certification in the subsequent year, ICS and sacks.

**The second year (2006).** After PT PMA resigned from the project, PT Big Tree Farm was commissioned to be the buyer. For the Ilepadung group, the first year premium price of Rp8 200 applied, but for the Uru, Kringa and Rowa groups, the price premium was calculated in a different way.

In Uru, Kringa and Rowa, as the price at the farm level was Rp6 800 per kg, PT Big Tree Farm decided to pay Rp7 500 per kg. These three groups received a lower price than the group in Ilepadung because the quality of the cashew nuts they produced was inferior.

### Discussion

Based on these two years of experience, there are a number of points that merit discussion. This discussion is important for monitoring project progress and for the basis of improvements to the project or similar projects in the future.

#### ICS and certification

In terms of capacity, the local inspectors (local ICS) are fairly well equipped to perform their roles in accordance with the standards set by IMO. Organic certification was issued to farmers' groups. This project is the first one in Indonesia to have introduced international organic certification for farmers' groups. Furthermore, all four farmers' groups obtained certification within one year (Gamper, 2005).

However, as far as coordination is concerned, the local inspectors cannot perform their roles effectively if the ICS providers are not properly coordinating the implementation of internal inspections by the local inspectors, as required. This happened during the first year of project implementation to the farmer group in Kringa. The ICS provider Bangwita failed to coordinate local inspections properly and as a result, the internal inspection was not executed to IMO standards. As a consequence, the Kringa farmers' group did not receive a recommendation for organic certification at the same time as the other groups and had to undergo a second round of inspection. It was only when IMO performed a reinspection that this group met the standards and eventually received organic certification.

#### The role of the farmers' groups

The achievements of the farmers' groups in this project are quite significant. They were able to participate in an organic certification project, which included implementation of internal control. Gamper (2005) cited as one of the project's achievements, that the four farmers' groups in Flores that had been trained in setting up ICS had passed inspection by the international certification institution, IMO.



The value being increasingly placed on environmentally and socially beneficial production and consumption supports the entry of small farmers in developing countries into the global market (Crucefix, 1998). However, much depends on the capacities and responsiveness of the farmer groups (Manalili, 2003). Unfortunately, not all the farmers' groups participating in this project were strong. This meant that each farmer group had to strengthen its members' capacities in cashew nut marketing. As an example, not all farmers documented their activities as a matter of routine. In fact, this is one of the key lessons learned from the development of organic farming in developing countries. In Uganda, organic cotton exporters found that they had to pay a member of staff to ensure proper documentation was kept (Crucefix, 1998). In this project, although the role of the local NGOs included assisting the farmers with documentation, eventually, the farmers' groups must be able to do this for themselves.

In the first year of the project, the farmers received no training on sorting, grading and processing. As a consequence, the farmers did not pay enough attention to product quality. At the end of the first year and in the second year, the farmers started receiving training in processing (shelling unprocessed cashew nuts). The training was done mainly with the groups in Ngada and Sikka districts, as the farmer group in Ilepadung were already well skilled even before the project began. The three groups are currently receiving training in processing. One particular processing aspect where they still need to build their skills is shelling. Normally, shelling around 1–2 kg of cashew nuts takes a whole day. As a comparison, the Ilepadung group can normally shell 5 kg of nuts a day. A higher rate of splitting nuts shortens the storage time, as well as the time it needs before the nuts reach the market.

#### **Marketing chain and its actors**

All the stakeholders in this project are new to the marketing of organic cashew nuts. In the first year, a marketing problem was encountered when PT PMA (the sole buyer) failed to honour its commitment to purchase the organic cashew nuts produced by the farmers. As a result of PT PMA pulling out of the project, the plan to make the CCC the cashew nut processing centre failed to get off the ground. This had a devastating effect on the marketing of the farmers' products.

The unprocessed organic cashew nut market was unable to absorb the entire production. Furthermore, the process market could not be targeted due to the limitations of the buyer to process the unprocessed nuts into grade A shelled nuts. Of the four farmers' groups, only the group in Ilepadung had the skills to produce shelled nuts.

This first year's experience was an important lesson for all involved in this project. The project is now exploring possibilities with other reliable buyers for organic cashew nuts. The project explored market opportunities such as Australia, ACHAL (India), Flores Farm (Germany) and Bali (Big Tree Farm). All showed some interest, however, none of them entered into a contract, except the Big Tree Farm.

#### **Price**

In the first year, because the partnership with PT PMA and CCC did not function as planned, the farmers did not receive the anticipated profits from the sale of premium organic cashew nuts. The farmers' group in Ilepadung sold their organic cashew nuts to

CCC. Unfortunately, CCC got into difficulties as a result of which the farmers in Ilepadung suffered some financial loss. The non-functioning of CCC also resulted in problems for the Rowa group when the farmers' cooperative purchased 15 tonnes of organic cashew nuts from the farmers (at Rp7 500/kg) and sold them to the CCC for Rp7 800/kg. As it turned out, the CCC could not buy all 15 tonnes and the cooperative had to dump three tonnes of product on the conventional market at a time when prices had slumped to Rp5 500/kg.

This first year's experience left the farmers disillusioned with the project. In addition, the plan to pay the fee for local inspectors out of the premium price received could not be realized. As a result, the project paid the local inspectors' fees.

Although premium prices were worked out in more detail for the second year, there has been a drastic decrease in yield, especially in Kringa and Uru, where the yield declined by almost 50 percent. The reason for this was the long dry season, which was then accentuated by pests and diseases.

### **Recommendations**

According to Crucefix (1998), benefits from organic farming are seldom immediate. Small farmers will require considerable support or incentives over the initial years if the system is to be initiated and maintained. The project results confirmed this observation. Below are some of the recommendations arising from the project team's own reflection complemented with some insights arising from a livelihood study by Gamper (2005) in the four project locations and a marketing study by Wheatley and Associates (2006).

#### **Collective marketing**

Collective marketing, one of the goals of this project, has not been completely realized. Collective marketing is a possibility owing to the poor relationship between traders and collectors that will give farmers' groups an opportunity to deal directly with the traders. Another supporting factor is the competition for supply, which demands that the traders collect the product as quickly as possible. Direct contact between traders and the farmers' groups is more profitable for both parties. For the farmers' groups, this will provide a price incentive for the farmer of around Rp100–150 per kg (Wheatley *et al.*, 2006). Of course this will only be realized when the volume of product is aggregated.

#### **Market Segmentation**

The project should explore the possibilities of non-export markets in the context of enhancing the efficiency of conventional marketing channels. Factors in this equation are an improvement of the institutions involved in the marketing chain and of the market players. It also has to do with the farmers' capacity, especially in processing cashew nuts and guaranteeing product quality.

#### **Price information**

The project has not managed to achieve the prices as planned. Several compelling reasons are put forward by Wheatley *et al.* (2006) as to the importance of price information in the marketing of cashew nuts. Both farmers and traders confirm that fluctuating prices are a problem for them when it comes to marketing cashew nuts. The

constant fluctuation in the price of cashew nuts necessitates a price information system that is accessible to farmers and traders every day. This system could be used as a tool for analysing seasonal price trends, allowing farmers to store and sell their produce at the right time.

#### **Processing of cashew nuts by the farmers' groups**

The farmers in Flores need skills in processing cashew nuts. As well as providing added value, shelled nuts can be stored more easily and for longer than unprocessed nuts. Training the farmers to do this will not be difficult because the farmers' group in Ilepung is already quite skilled at processing the nuts.

There are two important points regarding the processing of cashew nuts that should be borne in mind. First, as well as processing skills, the farmers also need access to the necessary tools (*kacip* or clippers). This would be of great assistance to the farmers. Second, an area that has not been explicitly explored by the project and should be is the role of women in the processing of cashew nuts, because most women have proven to be quite skilled at shelling nuts.

#### **Better communication mechanism between all stakeholders**

The number of stakeholders involved in this project, coupled with the complexity of the certification process, has delayed the implementation of the project. A communication mechanism between stakeholders and with external parties (such as traders and government) should be developed to ensure the free flow of information related to cashew nut marketing. Support for communication equipment is sorely needed, bearing in mind the mountainous topography of Flores and the poor road access.

### **Conclusions**

Several conclusions can be drawn from the first two years of this project. Strengthening farmers, while still in the initial stages, has been achieved by the project.

#### **Organic certification given to cashew nut farmers' groups in Flores**

In its first year, the project succeeded in securing international organic certification for the four farmers' groups involved in this project. This certification from IMO is in line with NOP standards and EU standards. This will promote the competitiveness of the organic cashew nuts produced by the Flores farmers at the international level.

The motivation and awareness of the farmers participating in the project to enhance the quality of cashew nuts through organic certification is growing, although in economic terms, the farmers have yet to enjoy the premium prices that were initially expected by the project.

#### **ICS functions to support the organic certification process**

The farmers have a growing understanding of the organic certification process and the ICS work system used for internal control by the organic certification institution (IMO). Thirty one farmers are involved as local inspectors. This is a significant achievement in the capacity building of the farmers, which should be continued.

### **Marketing**

Collective marketing must be supported in the future because the farmers' groups have not had much training and are not skilled in this area. The failure to obtain premium prices and the problems with the marketing process are key points to note from the two years of experience of this project.

There has been quite sharp criticism of this project for targeting the export market, which, its critics say, does not guarantee a large- and safe-enough market. Opportunities for improving the conventional marketing chain should also be explored.

### **Cashew nut processing**

The farmers need training in processing cashew nuts. The farmers' groups need the time and opportunity to perfect these new skills.

### **Multistakeholder collaboration**

The benefits of multistakeholder collaboration should be clear for everybody. The first year's experience showed that poor communication and unclear task division among the participants created problems in the project implementation. This was revealed during the self-reflection process. For example, VECO Indonesia focused on strengthening the farmers' groups in organic certification, while Swisscontact focused on market access and orientation.

After the self-reflection process, improvements were made in the second year. Improvements included a clear division of roles, clear operational plans, a contract between local NGOs, farmers' groups, VECO Indonesia and SwissContact. Furthermore, each project stakeholder has searched for new market opportunities. After the improvement, the project has run smoothly.

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## **Supply chain improvement for mangoes in the Philippines**

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### **Abstract**

*Optimizing post-harvest and agribusiness systems to maintain fruit quality and improve marketing efficiency is one of the key strategies of the PCARRD/UPLB/ACIAR project on “Integrated Pest Management and Supply Chain Improvement for Mangoes in the Philippines and Australia”. The main objective of the supply chain improvement component is to identify and try out improvements to current practices and conditions for managing mango supply chains. An examination of a supply chain in Luzon and two supply chains in Mindanao demonstrated that fruit quality was lost before harvest as a high percentage of fruit failed to meet the quality requirements of the domestic and Hong Kong markets. Typically, more than 50 percent of the harvested fruit were of poor physical appearance with scab, insect damage, wind scars and latex burn emerging as the major problems. Fruit quality further deteriorated along the chain from the farm to major distribution centres in Manila due to poor handling. In many cases, anthracnose and stem-end rot become major concerns when the fruit ripened. The exporters and large traders are the key players in the mango trading business. Mango exporters either have their own buying stations in the supply areas or engage certain traders on a commission basis to procure mangoes for them. Procurement of mangoes is highly competitive with exporters and traders trying to beat each others’ price to secure the required volume. Nevertheless, inefficiencies are still evident and there are players and activities that appear unnecessary and prevail as a result of information asymmetry. There are important logistics constraints also, especially the limited capacity of air freight carriers servicing the Davao–Manila route. Effective preharvest pest management, careful post-harvest handling, application of hot water treatment for disease control, extensive dissemination of technical and market information, as well as improving the logistics situation in supply areas are among the potential measures to improve the supply chain for mangoes in the Philippines.*

### **Introduction**

Optimizing the post-harvest and agribusiness systems to maintain fruit quality and improve marketing efficiency is one of the key strategies of the PCARRD/UPLB/ACIAR project, “Integrated Pest Management and Supply Chain

Improvement for Mangoes in the Philippines and Australia.” This project requires a thorough assessment of the existing supply chain for mangoes with a view to identifying key improvement areas and carrying out actual improvements through a participatory approach. The paper highlights the preliminary results of the project. The next section outlines the methodology of the study. Significant findings are given in the third section, while the last section provides some measures to improve the performance of the supply chain.

In agribusiness, supply chain management (SCM) implies managing the relationships between the businesses responsible for the efficient production and supply of products from the farm level to the consumers to meet consumers’ requirements reliably in terms of quantity, quality and price. In practice, this often includes the management of both horizontal and vertical alliances and the relationships and processes between firms (Woods, 2004).

### **Methodology**

The study employed a supply chain management framework. Supply chain management simply refers to the management of the entire set of production, distribution and marketing processes by which a consumer is supplied with a desired product. Folkers and Koehorst (1998) (as cited by Woods, 2004) define a supply chain as a set of interdependent companies or entities that work closely together to manage the flow of goods and services along the chain in order to realize superior customer value.

#### **Identification of two supply chain groups and mapping supply chains**

Two agribusiness companies exporting fresh mangoes to Hong Kong cooperated in the study. Each firm is the principal player in its respective supply chain. Both procure fresh mangoes from the major production areas in Luzon (from January to June) and from Davao (in Mindanao) for the off-season (July to December). As Mindanao is the priority area for the project, this makes them as ideal cooperators. The strategy to work with major players or decision makers is crucial to ensure that measures to improve the supply chain will be coowned by the supply chain members. The firms are covered by confidentiality agreements which prevent disclosure of their identities. This, however, has little adverse impact on the project.

Supply chain maps were developed using the exporters as reference points. The map identifies the members of each supply chain, the flow of products, information and payment, activities and services conducted by supply chain members, critical logistical issues, key decision makers and external influences. A survey using a pretested set of questionnaires as well as key informant interviews was undertaken to answer the following key questions:

- Who are the key customers and what are their product requirements (especially quality standards)?
- How does product, information and money flow through the supply chain?
- What are the activities and services provided at each step in the supply chains?
- What are the critical logistic issues?
- Who are the major decision makers or drivers in the supply chain?



- What external influences affect the performance of the supply chain?

### Identification of areas for improvement

Areas for supply chain improvement were identified after the chain had been mapped and analysed. The study gave special emphasis to post-harvest practices along the chain including: (1) harvest; (2) field sorting and packing; (3) transport; (4) re-sorting and repacking; (5) storing; and (6) post-harvest disease control.

Other areas for improvement were also identified, guided by the six principles of successful SCM. These are: (1) a focus on customers and consumers; (2) a chain creating and sharing value among all its members; (3) making sure the product fits the customer's specification; (4) effective logistics and distribution; (5) an information and communication strategy that includes all chain members; and (6) effective relationship that give leverage and shared ownership (AFFA *et al.*, 2002 as cited by Woods, 2004).

### Significant findings

#### Key customers, product requirements and fruit quality at harvest

The supply chains investigated in the study cater to both the domestic and export markets. The domestic markets include supermarket chains and wet markets in major urban centres as well as processors located in the provinces of Bulacan in Luzon and Cebu in the Visayas. The product requirements of these markets are summarized in Table 1. The supermarkets require good quality mangoes: mature, green, clean and with smooth appearance. They only purchase "medium-sized" (250–300 g) mangoes classified into regular and premium grades. Normally, wet markets do not require specifications on product quality. The processor absorbs "reject" mangoes such as fruits with latex stain, latex burn, irregularly shaped, undersized, mechanically and insect-damaged fruits.

The Hong Kong market has no phytosanitary requirements. The grade standards and quality requirements for this market are fresh mangoes, mature, green, regular-shaped, smooth, and free from diseases, insect infestation and mechanical damage.

**Table 1: Quality and size characteristics of mangoes for different markets.**

Market	Destination	Characteristics	
		Quality	Size
Export	Hong Kong	Fresh green mangoes, mature, regular-shaped, smooth, free from diseases or insect infestation and mechanical damage	XL: ≥ 350 g L: 300–349 g M: 250–299 g S: 200–249 g SS: 160–199 g
Domestic	Supermarket	Fresh green mangoes, mature, regular-shaped, smooth, free from diseases or insect infestation and mechanical damage	Medium size only Regular: < 300 g Premium: ≥ 300 g
	Processor	Fruits with latex stain, latex burn, irregularly shaped, undersize, slight mechanical damage, and disease or infestation like capsid bug	Regular: ≥ 160 g Undersize: < 160 g

However, only a small percentage of the total volume of fruit harvested meets the quality requirements of the export markets. Some 68 percent of the fruit harvested from a major mango producing province (Abra) in Luzon and 50 percent of the fruit harvested in Davao were rejected. Poor quality fruit fetches much lower prices since they are sold only to processors.

#### **Post-harvest operations, product flows and fruit quality along the chain**

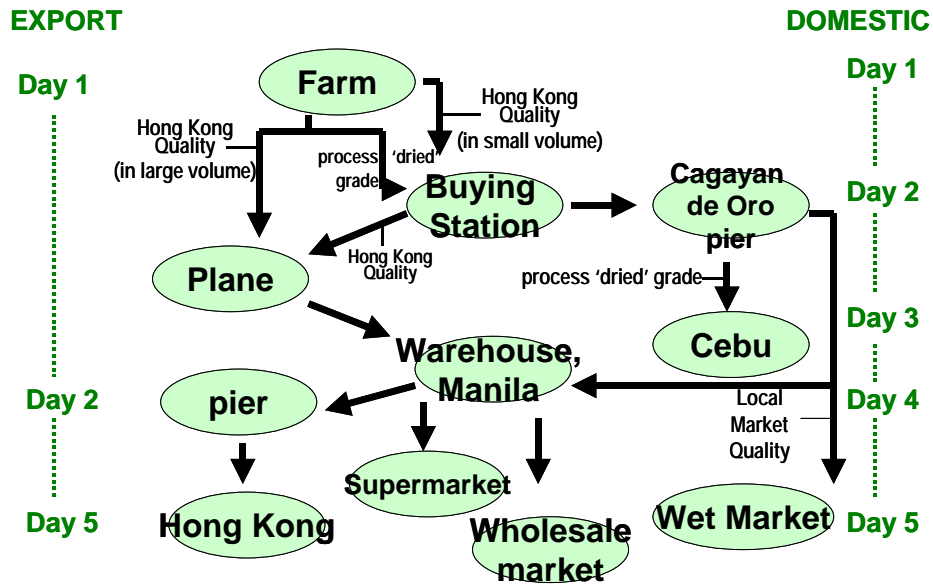
Harvesting usually starts before 09.00 hours. In areas that are too far from the buying station, harvesting is done much earlier in order to deliver the fruit to the buying station on the same day. This practice leads to heavy latex flow and eventually latex stains since the turgidity of the fruit is still high. Farmers are aware of this problem, but are constrained by the need to deliver the fruit on time. Harvesting is manual and laborious, thus farmers have to start early. Sometimes, harvesting is extended beyond the ideal time of 15.00 hours, thus the flow of latex is again excessive. Furthermore, farmers seldom provide for a 2–3 cm stem clearance from the pedicel when harvesting mangoes, which would minimize latex flow. There are farmers who place the freshly harvested fruit on newspapers spread on the ground before sorting and packing to remove the latex. This, however, is of little help once the latex has spread over the fruit.

Exporters normally send their collector agents to the farms so that fruit can be sorted and classified before being brought to the buying station. This is especially true for larger volumes. After field sorting, good quality fruit is packed into 12-kg cartons while poor quality fruit are packed into 25-kg used cartons (originally intended for bananas). In cases where fruit cannot be sorted in the field, they are brought into the buying station in bulk, usually packed in used 25-kg cartons or large rattan baskets. They are then sorted in the buying station and are repacked. Afterwards, the better quality fruit is airfreighted to the exporter's warehouse in Manila (in the case of Davao), or transported by truck in the case of mangoes harvested from northern Luzon. Fruit is normally re-sorted at the warehouse in Manila before final packing and loading in a 20-foot container for shipment to Hong Kong (Figure 1).

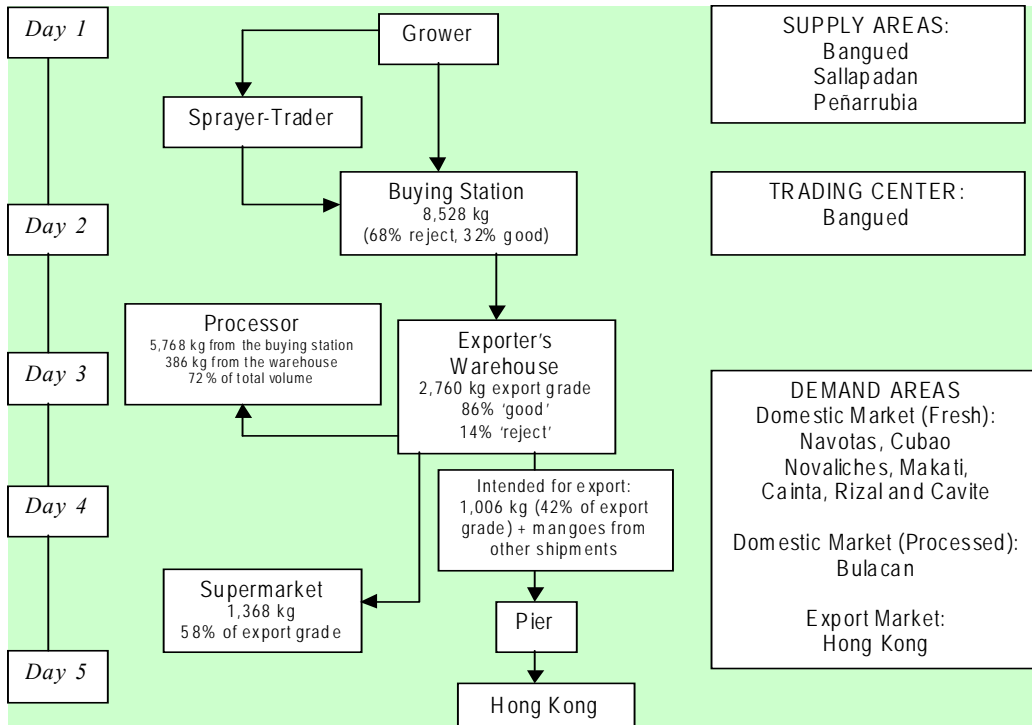
In Hong Kong, the container is unloaded in a container yard adjacent to the fresh fruit market in Yau Ma Tei. The cartons of fruit are then hauled by push carts to the market and stored in warehouses or stalls inside the market for eventual distribution to wholesalers, retailers and institutional markets. In cases where the fruit are intended for the Chinese market, the fruit is directly transferred from the container to a truck which takes the fruit to the People's Republic of China. It normally takes five days from harvest for fruits to reach the Hong Kong market.

Rough handling generally characterizes the movement of mangoes from the farm to the buying stations. In a particular shipment involving mangoes harvested in northern Luzon, poor handling was observed even at the exporter's warehouse in Manila. As shown in Figure 2, about 14 percent of the fruit considered to be of good quality at the buying station in the supply area were rejected at the Manila warehouse, primarily due to overstacking in the truck, rough loading and unloading, and poor handling during final sorting at the warehouse. Poor quality control at the buying station may also be an important reason. In another supply chain involving mangoes from Davao brought to a Manila warehouse, latex stains and damage due to poor handling are evident (Table 2).

**Figure 1: Mango supply chain in Davao del Sur and Davao del Norte, Philippines – product flow (2006)**



**Figure 2: Mango product flow – one shipment from Bangued, Abra, 2006**



Anthracnose and stem-end rot are important post-harvest diseases of mango, especially for fruit harvested during the rainy months of July to November (off-season). The fruit deteriorates very rapidly along the supply chain, especially when they begin to ripen. For fruit exported to Hong Kong, about 5 percent of each lot exhibits disease as early as upon arrival at the Yau Ma Tei market. Advanced deterioration is observed when the fruit is placed on display in the various retail outlets. The retail price in Hong Kong drops considerably as the disease becomes more prevalent. On average, medium-sized good quality fruit is sold for HK\$8–12 per piece in retail stalls. This drops to as low as HK\$1–3 per piece when the disease is at an advanced stage. One of the supply chains examined in the study employs hot water treatment to control these diseases. The incidence of disease was reduced and the severity was markedly less in hot water-treated fruit even at the table-ripe stage.

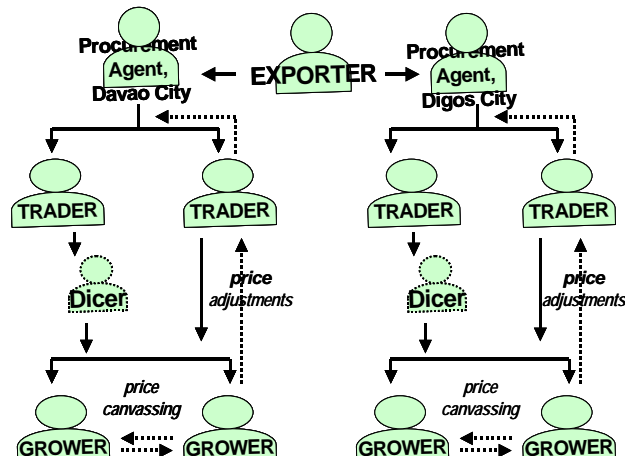
**Table 2: Quality profile of rejected mangoes from exporter’s warehouse in Manila.**

Sample	Preharvest defect	Post-harvest defect
1		Latex stain
2		Colour break, latex burn or stain
3		Colour break, latex stain
4		Compression damage, latex burn or stain, colour break
5	Small, misshaped	Latex stain, lenticel spots
6	Misshaped	Latex burn or stain, compression damage, bruise, colour break
7		Abrasion, latex stain
8		Latex stain, abrasion
9		Latex stain, compression damage, colour break
10		Latex stain
11		Colour break, compression damage, abrasion, latex stain
12		Latex burn or stain, colour break
13	Vein, wind scar	Lenticel spots, abrasion, latex burn or stain
14	Scab	Colour break, latex stain
15		Abrasion, latex stain, compression damage
16		Latex burn or stain, colour break
17	Scab, small, insect damage	Lenticel spots, latex stain
18		Latex stain, abrasion, colour break, compression damage
19	Insect damage	Latex stain, lenticel spots
20	Ant damage	Abrasion, bruise, latex burn or stain, compression damage, colour break

The flow of price information is asymmetric between the traders and farmers. This is evident from the fact that the traders are the farmers’ only source of price information (Figure 3). In addition, agents working on a commission basis proliferate in the major production areas. They locate farms with mature mango fruit and inform the traders for an agreed commission. In addition to the commission they obtain, it is common for

procurement agents to offer farmers a much lower price than the one quoted by traders. However, the problem on information asymmetry is lessened when there are several traders competing for the fruit. Nevertheless, in the more remote areas, there is often only just one trader operating in the area.

**Figure 3: Mango supply chain in Davao del Sur and Davao del Norte, Philippines – flow of price information(2006)**



### Critical logistic issues

**Farm-to-market road:** Rough farm-to-market roads contribute to losses, due to the mechanical damage sustained through compression and abrasion. Most farms are far from the buying station and fruit has to be transported by trucks or jeepneys. Compression damage is especially high when fruits are not properly packed and overstacking is practised. The cost of transportation may also increase, especially when the roads become muddy. In such cases, mangoes have to be hauled by sleds for long distances before they can finally be loaded into the truck.

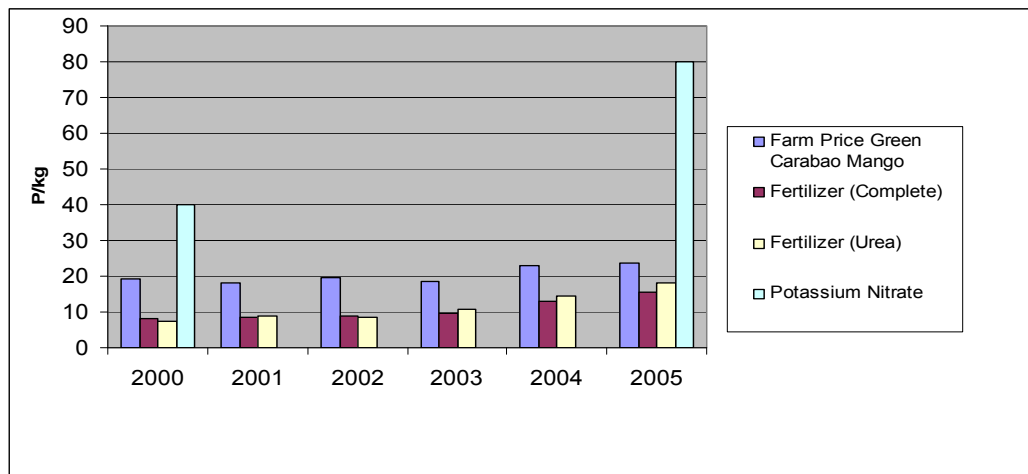
**Limited air freight capacity in Davao:** Air freight capacity servicing the Davao–Manila route is very limited. In cases when priority cargo such as tuna, cut flowers and other fruits such as rambutan and *lanzones* are available in large volumes, mangoes are often off-loaded by the major airlines. Thus, even if large volume of fresh mangoes is available in Davao, the volume that can be brought to Manila and eventually to Hong Kong and other export markets is limited. Fresh mango is often considered a filler in air cargo. As such, the freight cost is much lower compared with other types of cargo. The disadvantage however, is that fresh mangoes have a lower loading priority.

**Increasing cost of inputs:** The price of inputs particularly  $\text{KNO}_3$  and other fertilizers have doubled over the last five years (Figure 4). However, the farm price of mangoes remains practically the same. Net income from mango production is only about Ps4–5 per kg on average. Given an average yield of about 5.5 million tonne per ha, net income is relatively small.

### External influences

Mango production is covered by the Comprehensive Agrarian Reform Programme (CARP) which limits land ownership to a maximum of seven hectares. While some of the large plantations have already been subdivided into smaller parcels, others contend that this prevents farmers from achieving the economies of scale which are important for commercial export crops such as mango.

**Figure 4: Comparative price of mango and commonly used production inputs (2000-2005)**



Source: BAS

### Measures to improve the performance of supply chains

Many preharvest and post-harvest interventions have been identified to improve the performance of mango supply chains in the Philippines. Among others, this includes the application of integrated pest management to reduce insect damage and minimize the cost of pesticides; proper harvesting practices; improved practices to minimize handling-related damages, as well as application of hot water treatment to reduce fruit deterioration along the chain due to anthracnose and stem-end rot.

Farmers' access to price information should also be improved to enable them to exercise greater bargaining power with traders. The government should continue improving farm-to-market roads and other transport infrastructure to lessen the costs of transportation and physical damage not only to mangoes but to other agricultural products as well.

The cost of inputs must be reduced by addressing the inefficiencies in the input system and low-cost alternative inputs (e.g. organic) must be explored. Finally, the implications of CARP on the productivity or profitability of mango production must be examined in depth with the view to formulating and implementing measures to minimize any adverse impact.

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## **Emerging possibilities and constraints to Papua New Guinean smallholder coffee producers entering the speciality coffee market**

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### **Abstract**

*Papua New Guinea produces around 1 percent of the world's coffee, most of it Arabica. The average price it achieves for its coffee is below the price of many comparable Arabica-producing countries. Most of Papua New Guinea's coffee comes from smallholders producing parchment using a village-level, wet processing method. One of the major obstacles to the improvement of coffee quality in Papua New Guinea is the failure of the current marketing system to give the right price signals to growers, in terms of different prices for different qualities of parchment. The marketing system is highly competitive, with large numbers of traders and roadside buyers purchasing small quantities of parchment from smallholder coffee producers. Since many of the taste faults in coffee cannot be detected at the parchment stage it is not possible to reward smallholders who produce superior tasting coffee. Historically, two coffee chains have coexisted in the Papua New Guinea industry, with the plantation chains, a remnant of colonial occupation, producing higher quality coffee for the speciality market. In contrast, the smallholder chains produce coffee for the soluble market. While the market determines quality and hence price essentially by consistency of taste, the government regulated grading system for green bean determines quality by bean size and the level of defects. The two are not necessarily correlated. Furthermore, cultural differences between plantation farmers, exporters and smallholder farmers, contribute to the perception by smallholders that lower prices are due to excessive profits in the processing-export sector rather than to any inherent problems with coffee quality. A number of solutions have begun to emerge which will be explored.*

### **Background to the Papua New Guinea coffee industry**

#### **Production and prices**

Papua New Guinea is a relatively small player in the world coffee market, producing around 1 percent of world coffee exports or 1 million (60 kg) bags. In 2005, the major importers of Papua New Guinean coffee were Germany (48 percent), the United States or America (14 percent), Australia (14 percent) and Japan (9 percent) (Dambui *et al.*, 2006b). Much of the coffee exported to Germany, Australia and Japan goes to the soluble coffee market and hence attracts lower prices than those achieved in the speciality market.

Almost all of the coffee exported from Papua New Guinea is Arabica, which is produced in the Highlands at altitudes above 1 000 metres. Under the International Coffee Organization classification system, Papua New Guinean coffee is grouped in the Other Mild Arabicas category. While this is potentially good quality coffee, historically



Papua New Guinean coffee has received lower prices than the average, as most Papua New Guinean coffee sells at a discount to the Other Mild Arabicas Grade on the New York Board of Trade (or NY 'C'). In 2004 and 2005, around 60 percent of Papua New Guinean exports sold at a discount averaging 13 to 14 USc per pound (Dambui *et al.*, 2006a). In 2005, around 80 percent of Papua New Guinean coffee was sold as smallholder Y grade coffee (PSC, Y<sub>1</sub> & Y<sub>3</sub>) while only 20 percent was sold into the speciality market (A, X, Organic and Fair Trade). While Y grade coffees were sold at a discount to the NY 'C', the speciality coffees received price premiums (Table 1).

**Table 1: Green bean prices & differentials to NY 'C' for Papua New Guinea coffee (2005)**

<i>Grade</i>	<i>Price Lae (t/kg)</i>	<i>Differentials (USc/lb)</i>
A, AA	804	25
X	793	7
Organic	801	19
Fair Trade	920	
PSC	648	-7
Y1	606	-13
Y3	265	-66

Source: Dambui *et al.*, 2006: p. 22.

#### **A dualistic coffee production system**

Coffee production in Papua New Guinea comes from three main types of farms: smallholders, blockholders and plantations. Between 80 and 90 percent of production comes from around 250 000 smallholders involved in subsistence agriculture on customary land (Stapleton, 2000). Smallholders generally cultivate a few trees or a few hectares among their subsistence food crops. Coffee is the main source of cash income, which is used to pay school fees, purchase trade goods and meet traditional social obligations. Most of the coffee is sold as parchment, often to local roadside traders or has to be flown out in the case of the more remote locations. The parchment is produced using highly variable wet processing techniques. Suitable pulpers are in short supply, fermentation often occurs in bags and washing is incomplete or uses muddy water. Consequently, the quality of the parchment is highly variable as is the taste of the coffee made from this parchment.

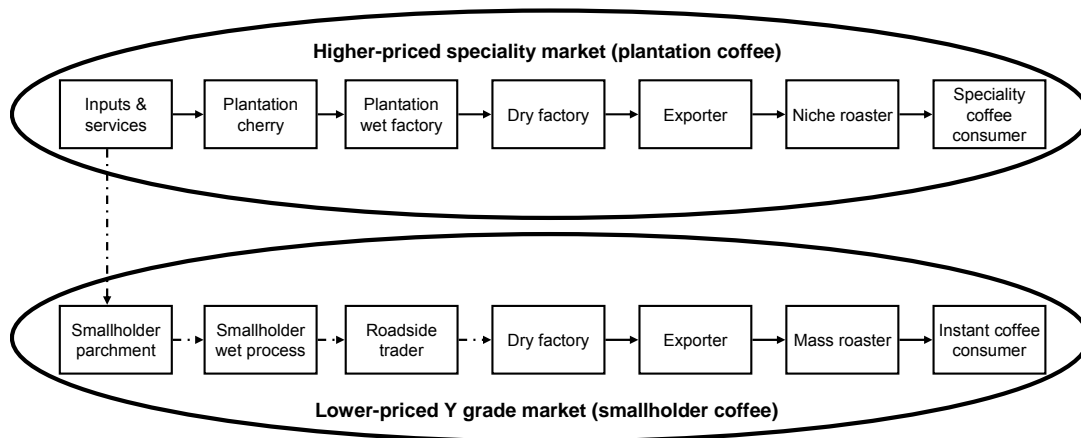
The blockholder sector is the smallest and is derived from a 1980s scheme that provided 20–hectare lots to around 250 business groups (Stapleton, 2000). Research indicates that many of these have since been subdivided between family members, so there is now a wide range of sizes. These farms tend to be run along more commercial lines with the use of wage labour and cash inputs, while processing is usually carried out using a pulper and a small wet mill. However, in many respects, the quality of their coffee is similar to that produced by the smallholder sector, for the quality of the parchment produced is highly variable and reflected in the taste of the coffee.

The few remaining plantations now produce less than 10 percent of total production. They are larger in size (hundreds of hectares) and often occupy leased land. Almost all

are majority or totally owned by nationals (Stapleton, 2000). These plantations achieve higher production per tree and per hectare. They use commercial operating principles and rely on wage labour and cash inputs to achieve this. The quality of their coffee tends to be better, mainly because of the better quality control systems employed in their wet processing mills. Some also have their own dry mills, but many use the same dry mills that are used to process the smallholder and blockholder coffee.

The traditional Papua New Guinean industry can be characterized as a dualistic supply chain model (Figure 1), composed of smallholder subsistence farmers and large plantations. The plantation sector sells most of its coffee into the speciality market, while the smallholder sector sells much of its coffee into the soluble or instant coffee market. Consequently, the decline in size of the plantation sector has contributed to a decline in the average quality and price of Papua New Guinean coffee.

**Figure 2: Traditional dualistic Papua New Guinean coffee systems**



### Problem perceptions

Some blockholder and smallholder coffee is sold as A or X grade coffee and hence finds its way into the speciality chain. However, the perceived wealth of processors and exporters, cultural differences between smallholders, plantation managers and exporters, and the higher prices paid for plantation coffee, lead to the perception by many smallholders and politicians that low prices for smallholder coffee are due to high margins in the processing and trading sectors and a failure to pass on prices for better quality coffee to smallholders. In response, government programmes have been formulated (Papua New Guinea Coffee Industry Corporation, 2002) to support grower groups to process and market their own coffee. Some of these programmes have focused on processing and marketing to traders (e.g. farmer cooperatives formed under the Smallholder Agricultural Credit Scheme and the EU-funded Stabex project). Other smallholders have tried to form cooperatives with direct links to overseas buyers (e.g. Papua New Guinea Coffee Federation).

With these issues in mind, this project was initially set up to address the problem that “one of the major obstacles to the improvement of coffee quality in Papua New Guinea is the failure of the current marketing system to give the right price signals to growers in terms of different prices for different qualities of parchment”. This paper sets out to explore the validity of this statement and to redefine the problem in a more positive light to show how “the operations of the coffee chains can be improved so that relative prices for Papua New Guinean coffee will improve and farmers will be appropriately rewarded for their role”. The results presented are based on interviews and focus group meetings with farmers, farmer groups, processors, exporters and staff from the Coffee Industry Corporation.

The key issue is one of establishing systems whereby it will be possible for buyers along the chain to have confidence that they are buying higher quality coffee and therefore to pay an appropriate price for the improved quality. A number of solutions, which have emerged to resolve this problem will be discussed.

### **Quality determination in world coffee and in the Papua New Guinean coffee industry**

Coffee is prepared for the consumers in two main ways: in a soluble or instant form or in a roasted and ground form. Around three quarters of all coffee consumed in the world is roast and ground, with the rest being consumed in soluble forms, although the proportion going to each varies widely from country to country (International Trade Centre UNCTAD/WTO, 2002). Soluble coffee can be further divided into spray-dried and freeze-dried forms with spray-dried being at the cheaper end of the market. Almost all of these coffees are derived from blends of beans from a range of sources. Cheaper coffees are produced from lower-priced Robusta coffee and the lower-priced Arabica coffees. This market is highly price-competitive and dominated by a few large roasters.

Roast coffee comes in many forms, but the mainstream market is for blended coffee with the coffees coming from many sources, which are often interchangeable (International Trade Centre UNCTAD/WTO, 2002). Essentially roasters in this market blend to a taste and price and the market is very competitive. Many coffees that do not have particular characteristics to set them apart end up in this market where they face stiff competition. Concentration has been less pronounced in this sector because of the recent expansion in what can be called the speciality sector.

The speciality sector is a broad term to cover coffees “which either command a premium price over other coffees or are perceived by consumers as being different from widely available mainstream brands of coffee” (International Trade Centre UNCTAD/WTO, 2002: p. 65). This sector includes coffees that have niche market characteristics or have other certifications that attract premiums (e.g. Café Practices, Organic and Fair Trade).

A coffee’s suitability for a niche market depends on whether it meets certain quality and availability characteristics. The price will tend to increase with increasing quality and decreasing availability. Examples of price being determined by exclusivity include Café *Chon* from Vietnam and *Civit* coffee from the Philippines. Both are extremely rare

because the beans are manually extracted from the faeces of, respectively, foxes and native cats that have consumed the beans.

Quality of coffee is essentially a subjective characteristic determined by the tastes of the particular country and the segments within the market. Quality coffee can be categorized into three groups (International Trade Centre UNCTAD/WTO, 2002: p. 65): exemplary (limited availability and fine or unique cup); high quality or premium (either single origin or blends but of good cupping quality, may not be visually perfect); and mainstream (average quality). Good quality coffees can attract considerable premiums at retail level, which can also result in worthwhile although still lower premiums to farmers. Nevertheless, it is important to recognize that speciality coffees account for less than 15 percent of the world market.

As indicated in Table 1, Papua New Guinean coffee going into the speciality market does attract a premium but most are not attracting high quality premiums. This implies that Papua New Guinean coffee is competing in the larger segment of the speciality market for high and mainstream quality coffees. Nevertheless, it signifies that there is scope to sell more coffee into this market if it is properly processed.

The other segments of the speciality market which have been largely untapped by Papua New Guinea are the organic and various forms of environmental, sustainable and ethical markets. In 2004–2005, only 7 545 bags (0.7 percent) of Papua New Guinean coffee were sold as organic (Dambui *et al.*, 2006b), despite the fact that a large proportion of the coffee is grown under organic conditions. Similarly only 5 250 bags (0.5 percent) were sold as Fair Trade. While the trend has been increasing, this is a small proportion compared with some other countries (e.g. 13 percent in Mexico [Kilian *et al.*, 2004]).

For historical reasons related to the colonial past and different wet processing systems, there has essentially been a dualistic grading system for Papua New Guinean coffee that corresponds to the dualistic coffee chains: the plantation grades (A & X) and the smallholder grades (known as Y grade). However, this is not immediately apparent as the parchment grading system highlights moisture, defects and colour, while the green bean grading system highlights bean size, defects and colour, with cup quality as an additional largely intangible factor. While coffee can be graded for bean size and levels of defects, it is not possible to grade for taste until it is roasted and cupped. Even if most of the coffee has a suitable taste, only a very small number of off-flavoured beans can ruin the taste of a batch of coffee and hence reduce the price.

Consequently, while the market determines quality and hence price ultimately by subjective taste or flavour characteristics and the consistency of these tastes, the Papua New Guinean grading system does not emphasize this. This puts Papua New Guinean coffee producers at a disadvantage since taste characteristics are becoming more important as coffee is produced to meet the higher priced speciality markets. Most parchment is graded for moisture and defects while green bean is graded largely by bean size and levels of defects. Particularly in the Y grade market, traders grade and blend to meet maximum defect specifications and cupping is mainly practiced to ensure that off-flavours are not present. Some parchment buyers further degrade the system by offering “*wan prais*” (one price) for all parchment.

Notwithstanding these problems, there is still a ready market for Y-grade smallholder coffee because of its fruity and wild taste (Wheeler and Kufinale, 2005). However, the problem is with consistency of taste. This lack of consistency is derived from the variation in processing (particularly smallholder wet processing) and deficiencies in the grading and payment systems. Lack of consistency is the major reason for the discounting of Y grade coffee compared with the NY 'C' and other washed Arabicas.

### **Constraints to the improvement of quality in the Papua New Guinean coffee industry**

There are many constraints to improving the quality and hence price paid for Papua New Guinean coffee. Some of these are external constraints to the industry, which can only be solved by government action. These include poor roads and communications, law and order, uncertain land tenure and lack of bank finance to the coffee industry. Although each of these may have an impact on possible solutions, they are not discussed in this paper. Other constraints, which will be discussed include: confusion about quality; inconsistent quality due to processing methods; confusion about causes of low and fluctuating prices; social and cultural distance between sectors of the industry; and the small amounts of coffee available for sale. There are often overlapping elements between these constraints.

#### **Confusion about quality**

Many smallholder coffee producers have the perception that quality is determined by bean size and defect levels. They are aware that A grade beans, which are larger and have lower levels of defects, receive higher prices and that dry processors are able to grade green bean to take out larger beans and remove defects. Some of this coffee is sold as A grade. What they do not realize is that the average quality A grade coffee receives only a small premium to New York 'C' compared with plantation A grade that has a recognized brand backed up by consistent performance over time.

Smallholders have almost no understanding of the operations of the coffee market beyond their relationship with the roadside trader or factory buyer. They do not drink coffee and have not been exposed to differences in taste between the various qualities of coffee. They have little understanding of the operations of a dry processing mill or of the functions of an exporter and no understanding of the various markets for their coffee. Consequently, they do not make the link between their own processing procedures and the prices they receive for quality. This confusion about quality leads to calls from smallholders and politicians for them to be able to process and market their own coffee without going through the established processors and marketers so that they can obtain better prices for their coffee.

#### **Inconsistent quality due to processing methods**

Coffee in Papua New Guinea is produced using the wet processing method. However, there is considerable difference between the quality of parchment produced from a large wet mill with proper quality control procedures and parchment produced by most smallholders. Handling of coffee from harvesting to parchment is the major determinant of the differences between Y grade coffee and some of the plantation A coffees sold as speciality coffees. Average quality Y grade coffee has a range of winey and fruity

flavours and is often thin. As previously indicated this has a market, but it is not a speciality market. The same cherry processed in a properly managed wet mill will lack these flavours and in most respects cannot be differentiated in taste from a cherry picked from a well run plantation. As one major coffee company manager says: “There is no such thing as bad coffee on the tree”.

The problems of inconsistent quality in smallholder coffee begin with the failure to harvest and process only red cherry and end with poor drying. Other factors leading to inconsistencies include:

- not pulping all cherry on the same day as harvest;
- poorly adjusted pulpers or use of other pulping methods;
- failure to separate rubbish, floaters, chipped or broken beans from properly pulped beans;
- overfermentation often in unclean bags;
- poor washing of beans or washing in unclean or muddy water;
- drying on the ground or in situations leading to contamination or extended drying periods;
- incomplete drying.

The key problem is that most smallholders process their own coffee and there is very little consistency in this process from one farmer to the next. Accordingly, each farmer’s parchment will have different characteristics. The causes of this problem are a lack of knowledge of proper processing methods and the link between processing and price and the difficulty of getting a large number of farmers to process exactly the same way.

#### **Confusion about causes of low and fluctuating prices**

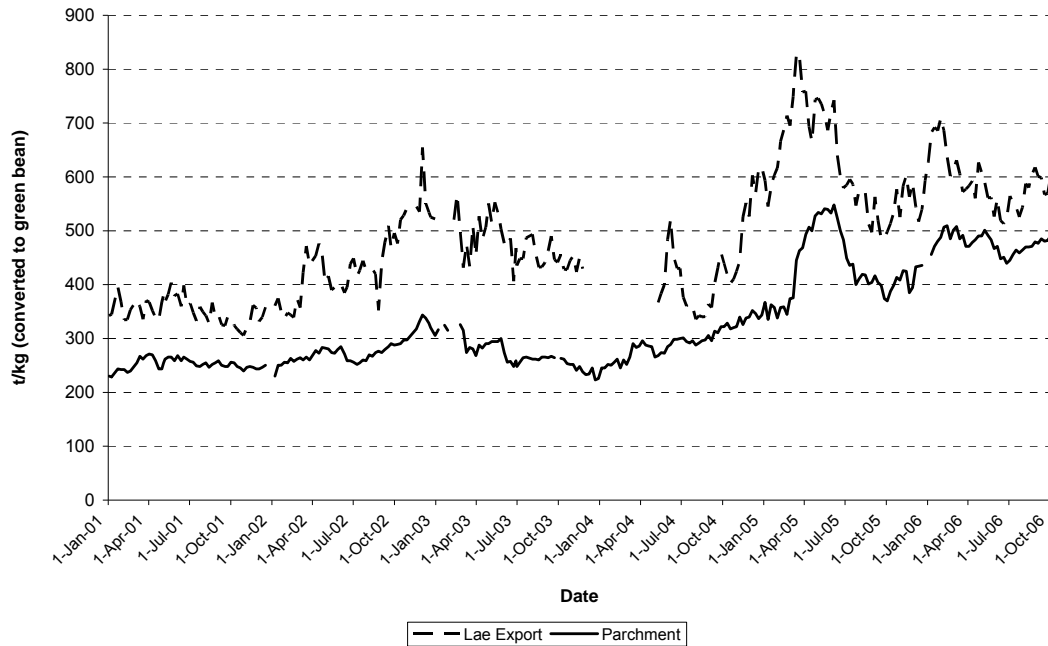
There is also a widespread belief that low prices are the result of high margins and fraud in the processing and exporting sector. Smallholders have almost no understanding about the causes of fluctuations in world coffee prices and the size and quality of Papua New Guinean coffee relative to other countries in the world. Consequently, they blame low prices and fluctuations in prices on unscrupulous buyers and traders.

While there will always be some unscrupulous buyers and traders in any market, Papua New Guinea has a highly competitive free market when it comes to buying parchment. There are many thousands of roadside buyers, 57 registered dry factories and 17 registered exporters (Dambui *et al.*, 2006a). Most smallholders have a range of choices when it comes to selling their coffee.

Evidence from Papua New Guinea Coffee Industry Corporation (CIC) weekly statistics suggests that smallholders receive a very competitive proportion of the FOB price for green bean. As shown in Figure 2, which is based on weekly No. 1 grade parchment prices at the factory door converted to green bean price and the export price at Lae for Y grade, parchment prices are highly correlated with export prices. The Pearson correlation coefficient between the two prices from 2001 to October 2006 is 0.90. For the main months from April to September for the years 2001 to 2006, the price for No. 1 grade parchment at the factory door averaged 72 percent of the export green bean price

at Lae based on an assumed recovery rate of 73 percent. The FOB Lae prices are also highly correlated with the NY 'C' price with a correlation coefficient of 0.96 between 2001 and 2006.

**Figure 3: Y grade export prices (FOB Lae) & No. 1 grade factory door parchment prices 2001–2006 (t/kg Green Bean equivalent)**



Source: Derived from Papua New Guinea Coffee Industry Corporation. 2001–October 2006 Weekly Market Prices for Broadcast

### **Social and cultural distance between smallholders and the plantations, processors and exporters**

The hangovers of a colonial past with its race-based social hierarchy and the dualistic nature of the industry still resonate in the Papua New Guinean coffee industry. Most of the large plantations, processing factories and export operations are managed by people whose cultural backgrounds distinguish them from smallholders. While they are not necessarily wealthy in comparison with managers of similar operations in developed countries, they are still much wealthier than smallholder farmers. In addition, most do not belong to any of the clans of the Highlands, although many have been born or spent most of their life in Papua New Guinea and have a good understanding of the culture. In combination, these factors exacerbate the belief by smallholders that they are not receiving a fair deal.

### **Small quantities of coffee for sale**

Because of the small numbers of coffee trees owned, picked and processed by each smallholder farmer, the quantity of parchment they have for sale at any one time is small. Parchment is also a liquid item and farmers store parchment for sale when they

need cash for family and social obligations. Here roadside traders serve a useful function since they buy small quantities of coffee for cash and aggregate these small lots of coffee into larger numbers of bags. They then sell the parchment to a dry mill that in turn processes it and sells it to an exporter. However, the quality of this coffee is highly variable.

The problem for processors and exporters is that they sell and ship coffee in 300-bag containers or 18-tonne lots. The buyer of this container expects all the bags to be of the same consistent quality, which will include size of bean, level of defects and taste. Some characteristics are obvious in the parchment, but taste is generally not, so there are information problems in the purchasing transaction. In almost all cases, whether the processor is buying from a farmer or a roadside trader, neither party will have any real knowledge about the taste characteristics of the coffee. It only becomes economic to taste coffee when buying around 30-bag lots. Consequently, parchment buyers face risks when buying and discount the price to allow for this.

A similar problem also exists for a farmer. If the farmer is producing high quality parchment, but only has a small amount, they are unlikely to be rewarded as the trader cannot source enough to fill a container. The roadside traders have no way of determining superior quality or of being rewarded for purchasing superior quality coffee because they face a similar problem when selling to a processor. Similarly, a processing factory can only reward a farmer for the visual quality of their coffee, not the taste, because it is not feasible or economic to taste small lots of coffee.

#### **Implications of these constraints to the problem of improving quality and price**

While the mainstream Y grade coffee chain in Papua New Guinea is highly competitive and is efficient in that it quickly adjusts to world prices and provides smallholders with a fair proportion of export prices, it is not able to reward smallholders for producing better quality coffee. In fact, the system tends to have the opposite effect because smallholders who produce poor quality coffee can often receive the same price as smallholders producing superior quality coffee.

Although it is possible to make improvements in this system through education, its inherent problems will remain. This does not mean that government should ban roadside traders because, as already indicated, they provide a valuable service for village farmers and industry. For smallholders they act as a source of cash by buying coffee at the village level and for industry, they take the risk of buying and transporting coffee from remote villages over very poor quality roads and the risk of theft by rascals. Systems to overcome these constraints are emerging.

#### **Emerging coffee chains aimed at achieving higher prices**

As is obvious from Table 1, Papua New Guinean coffee that achieves A grade, Organic or Fair Trade grades is sold at a considerable premium to NY 'C'. Unfortunately, only around 10 percent achieves this status. The key reason for this difference in price, which is around US\$30–40 per pound, is the poor processing at the village level, leading to inconsistent product quality.

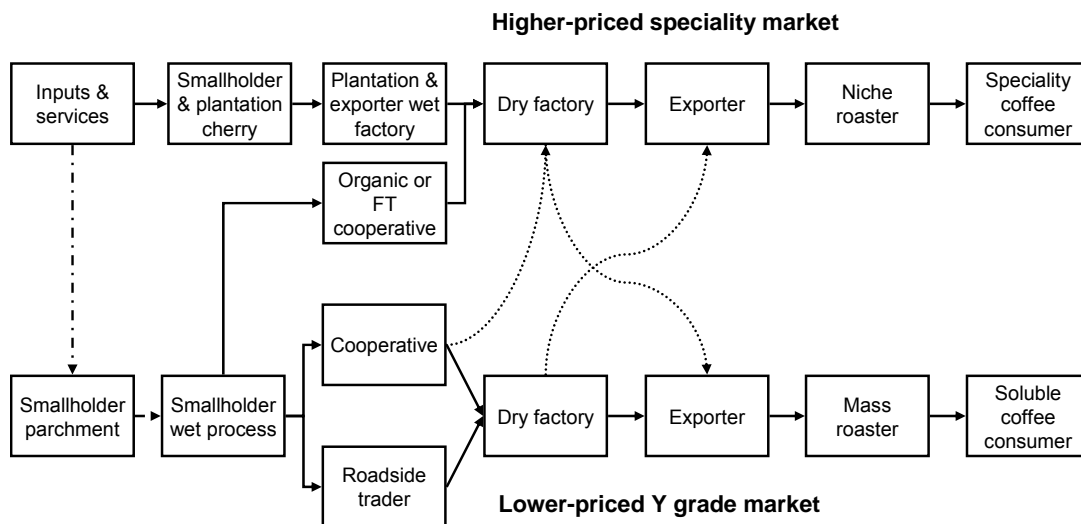


A number of chains have overcome this problem by improving quality or delivering to accredited organic or Fair Trade markets through:

- purchase of smallholder and blockholder cherry by centralized wet mills owned by plantations and exporters, to produce speciality coffee;
- exporters who have established relationships with smallholder cooperative groups to improve the quality of their coffee and receive accreditation to deliver to the organic and Fair Trade markets;
- smallholder cooperative groups trained to deliver higher-quality coffee to exporters.

The first two of these options directly target the speciality market to achieve higher prices, while the third attempts to improve price by overcoming the inconsistent quality and small quantity constraints. These chains are illustrated in Figure 3.

**Figure 4: Emerging Papua New Guinean coffee chains**



### Chains in which centralized wet mills purchase cherry

In the key coffee producing provinces of the Papua New Guinea highlands, many smallholders have access by road to large wet processing mills. These mills can be on existing plantations who buy cherry from surrounding farmers, forming a type of nucleus estate model. The other model is a specially built wet mill that buys cherry from surrounding farmers. The catchment zones are generally a 20- to 30-kilometre radius from the factory, depending on the quality of the roads and the location of the factories. In some cases, farmers deliver directly to the mill and in others, the factory sends out trucks to procure the cherry from the farmers.

While there are a number of variations in the operations of the nucleus estate model, the key is to process the smallholder's cherry using the same processes used for their own coffee and to sell it to the speciality coffee market as plantation grade coffees. In some cases, the coffee is kept separate from the plantation coffee for traceability and other

reasons, although this is not universal. In some cases, the plantations have their own dry mill and exporting arm, while in others they use other companies as dry processors and exporters. In the latter cases, they tend to establish close relationships with the exporter. Similarly, there are a number of variations with the stand-alone wet mill model. In some cases, the wet mills are co-located with a dry mill or the company has its own dry mill. It may also be a subsidiary of an exporter or have an established relationship with an exporter.

To achieve higher prices for their coffee, these chains are following two strategies. The first is to attain volumes of coffee processed to the standards that exist in the Papua New Guinean plantation sector. This coffee can sell at plantation prices because it has consistent standards and hence taste. To this end, they emphasize buying only ripe red cherry, as this is a critical factor in achieving consistent wet processing. The second strategy is to achieve accreditation to a speciality coffee market. An example of this is Starbucks and their Café Practices programme. Some of these cherry chains have already obtained preferred supplier status and are aiming at strategic supplier status.

These strategies have been successful in obtaining higher prices for Papua New Guinean coffee and in passing on a considerable proportion of these prices to farmers. As is indicated in Figure 4 farmers who sold cherry rather than parchment received an average of around 100 Papua New Guinean toea (US\$35) per kilogram parchment equivalent (or one-third) more during the 2004, 2005 and 2006 coffee seasons. The difference varies from season to season depending on the world price and domestic seasonal factors. In 2006, with high world prices and a local shortage of coffee, fierce competition increased the premium to around 130 Papua New Guinean toea (US\$45) per kilogram parchment equivalent or around 38 percent. It also appears that the level of competition for cherry has been increasing over the years and that farmers are receiving a higher relative price for cherry.

The model of centralized processing of cherry is expanding in Papua New Guinea and has the potential to expand further. There is still considerable room for improvement through adopting quality assurance schemes and achieving accreditation to speciality markets such as Starbucks. However, there are some constraints to some of these as the Café-Practices model has been developed for the Central and South American system and this creates problems for Papua New Guinea with its large numbers of very small coffee farmers. However, some of the chains have or are developing systems to overcome these problems.

A major constraint to the expansion of the schemes is the poor condition of the roads and to a lesser extent, problems of law and order. Cherry must be delivered to the mill for processing on the same day it is harvested. Because the Papua New Guinean coffee industry is widely dispersed, often in remote areas, the system is only suitable for limited parts of the industry until roads are improved.

Another emerging problem is the increase in cherry theft. This is occurring because of the higher prices for coffee over the last two years as well as the increase in cherry buying. The expansion in mills buying cherry is occurring at two levels: the buyers of ripe red cherry who are aiming at the speciality market; and buyers of poorer quality

cherry who have problems achieving premiums for their green bean. Cherry theft has led to calls for a ban on cherry buying similar to a ban that existed previously. Much of the cherry theft occurs at night. Because the coffee trees are strip picked, the quality of the cherry is poor and can only be sold to the less discerning buyers. Some of the speciality buyers have schemes that demand traceability under quality assurance programmes to limit this problem. Most cherry buyers do not. It remains to be seen whether the buyers of the poorer quality cherry will be able to compete as they are currently paying similar prices to the speciality buyers for their cherry but will not be able to achieve the same quality and thus be unable to access the speciality market.

**Figure 5: Papua New Guinean factory door cherry and No. 1 grade parchment prices 2004–2006 (converted to parchment at 5kg cherry = 1 kg parchment)**



Source: Derived from Papua New Guinea Coffee Industry Corporation. 2004–October 2006 Weekly Market Prices for Broadcast.

### Chains aimed at the organic and Fair Trade markets

A couple of chains are emerging that are targeting speciality markets by achieving certification for organic and Fair Trade, although at this stage they produce less than 2 percent of exports. These chains involve a relationship between exporters and farmer cooperatives. As shown by Table 1, considerable premiums are available for coffee that is certified under these schemes, with dual certification providing additional advantages. Others are also possible, such as Rainforest Alliance and Utz Kapeh, but these are not significant at this stage. While organic certification is possible for both plantation and smallholder coffee, the latter is the focus of this discussion.

The systems that are needed for organic and Fair Trade certification with smallholders are similar and require the establishment of cooperatives and traceability systems.

Providing these requirements are met, much of Papua New Guinean coffee would be eligible for certification under these systems. Because of their remoteness, most smallholders use very little if any chemicals and produce their coffee in sustainable multi-cropping systems. It would seem therefore that this system provides an opportunity for considerable expansion, because of the relatively small size of the Papua New Guinean industry. However, some key constraints are limiting this.

One of the key constraints is establishing and maintaining cooperatives and traceability systems. Cooperatives have a poor record in Papua New Guinea. Relatively low levels of education of village farmers and cultural issues generally lead to the failure of cooperatives due to a combination of conflict, poor management and corruption. Furthermore, in order to achieve certification, especially for organic, the process may take up to three years. Although no price premiums will be realized, the costs for inspection and auditing must still be met. As most smallholder farmers do not have the financial resources, the schemes that are overcoming these problems in Papua New Guinea generally involve a close relationship between an exporter and the farmer cooperatives. Considerable support, effort and costs are required from the exporter to facilitate the establishment and continued operation of the cooperative to ensure good governance and management. This is a slow process and is very much dependent upon the quality of local leadership. Certification is also complex and expensive, and arranging this would appear to be beyond the capabilities of most farmer cooperatives without the assistance of an exporter. Consequently, rapid expansion of these systems is unlikely and farmers and exporters who move too fast will probably fail. It requires committed exporters with an appropriate cultural understanding and patience.

Another constraint is that much of the organic and Fair Trade coffee is produced using similar processing systems to that used by producers of the mainstream Y grade coffee. This means it is still susceptible to problems of variation in quality and taste. If this issue is not addressed, customers are likely to complain about quality and markets could be lost. However, because of higher prices, more effort can be put into overcoming these issues. Existing chains focus on training in the village, with local inspections of parchment quality and hand sorting of the green bean.

### **Smallholder cooperatives delivering higher quality parchment or green bean to exporters**

A third approach, which has two schemes; one supported by the Coffee Industry Corporation and the other by an EU-funded project, is to support smallholder cooperatives in bulking up parchment, which a dry mill then processes under contract before it is sold to an exporter.

The Coffee Credit Guarantee Scheme (CCGS) was established in 1997 by the CIC under the Smallholder Agricultural Credit Scheme. The scheme was initiated by the CIC as a means of providing capital to smallholder coffee producers, who without sufficient collateral, security and equity, are unable to borrow from the banks. To facilitate the repayment of loans, those coffee producers who borrowed from the CCGS were placed into clusters at either the village level or on the basis of clans. Under Phase Two of the Smallholder Agricultural Credit Scheme, CIC established a farmers' marketing cooperative to process the smallholders' coffee into green bean. The green

bean is then sold on consignment to the exporter who offers the highest price. Considerable support is provided by the CIC to run this scheme, particularly when it comes to arranging collection, processing and sale of the green bean. Because of the central role of the CIC in the formation and support of these groups, there is no formal chain, because the CIC organizes the farmer group's parchment to be processed in a commercial dry mill and then facilitates the sale to an exporter.

Other farmer cooperatives are supported by the EU-funded Stabex project which is assisting grower groups to improve the quality of parchment delivered to processors and exporters. The project provides training, audits the books and helps groups to look for buyers, but does not make the decision for the group on whom to sell to. The Stabex project provides subsidies for dry processing to participants. The subsidy declines over time and disappears after three years. Once again there is no formal chain, because the relationships with processors and exporters are fluid.

Like the organic and Fair Trade schemes, both these schemes produce coffee using village-level wet processing methods and hence potentially have problems with consistency of quality and taste. Problems arise with variation in cherry quality, wet processing methods and moisture levels of parchment. There are no existing quality assurance programmes except for the focus on quality by group members and any systems implemented by the dry factory and exporter. Some smallholders are hand-sorting cherry prior to pulping to remove green cherry, but not overripe cherry, while others sort parchment. Consequently, it is difficult for these schemes to produce coffee suitable for the speciality market and their green bean is often just better quality Y grade or PSC coffee. They may achieve some price advantages through being able to sell larger volumes of coffee and avoiding the roadside traders.

Once again a key constraint to the long-term success of these schemes is the sustainability of the cooperatives. At present, they rely on support from the CIC and the Stabex project. It is possible that some of the groups will achieve the necessary cohesion and skills to become self supporting, but many may not for the reasons already discussed.

Another constraint is that these schemes cannot be easily expanded because of staff constraints in the CIC and the Stabex project. Possible solutions to these issues depend upon the location and characteristics of the group. Where groups are close to existing centralized wet processing mills, they may be able to establish a relationship to deliver cherry either as individuals or as a group. Another solution for more remote groups is to establish a relationship with an exporter who is willing to help them achieve organic and Fair Trade certification. The exporter may also be able to facilitate the maintenance of the cooperative. A third solution is for the cooperative to build and operate a wet mill that produces consistent quality parchment. While this is theoretically possible, it requires considerable cohesion and management skills by the leaders of the cooperative and probably support by a third party such as the CIC and will be unlikely to have a high success rate.

## **Conclusion**

Papua New Guinea sells the majority of its coffee at a discount to NY 'C' due to inherent problems with consistency of quality and taste. While the industry is highly competitive, the systems in place make it difficult to reward smallholder farmers for producing superior quality coffee. Only around 10 percent of Papua New Guinean coffee achieves significant premiums to NY 'C' and hence qualifies as speciality coffee. Most of this comes from the small numbers of remaining plantations. The challenge is to encourage systems that overcome the inherent constraints in the mainstream coffee industry so that more smallholder farmers can receive higher prices when they deliver superior quality coffee. The approaches to achieve this include:

1. Assist the expansion of commercial wet factories buying cherry and implement quality assurance schemes that enable them to sell to speciality coffee buyers. These schemes are providing price incentives of around one-third for farmers. Key constraints to the expansion of this approach are problems with achieving certification in the Papua New Guinean context, poor roads, law and order, and cherry theft.
2. Form organic and Fair Trade certified chains. These chains are also producing premiums for growers, although they entail higher costs because of the certification requirements. The key constraint to the expansion of these schemes is the need to have a functioning cooperative and product traceability. This is difficult in Papua New Guinea and the current successful schemes rely on a strong relationship between exporter and cooperative. Because they produce coffee with village wet processing methods, achieving consistent quality is an ongoing issue.
3. Form cooperative groups that produce larger quantities of consistent parchment that is dry-processed under contract and the green bean sold to an exporter. The successful schemes here currently receive support from the CIC and an EU-funded Stabex project. There is a question mark over the sustainability of these schemes when this support is withdrawn. Most of the coffee produced under these schemes is superior Y grade or PSC coffee rather than speciality coffee because of the variation in quality and hence it does not attract the same premiums as the other two approaches.

## **Acknowledgements**

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## The fair-trade market for fruit<sup>30</sup>

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### Abstract

*This article presents an overview of the international market for fair-trade fruits. It also details the history and values of the fair-trade movement. The activities of the Fairtrade organization are also developed. Fair-trade marketing enables smallholder farmers in developing countries to access niche markets in industrialized countries while receiving an assured fair remuneration for their labour, which is invested in the development of their community.*

For the next few minutes, I will give you a short introduction to Fairtrade<sup>31</sup>. I will introduce you to the organizational structure, some of the different products and standards, and provide you with an overview of fair-trade market development and trends.

Fair-trade is not something that is applied to apples grown in Europe. It started really from the South–North trade. The idea is that rich consumers in the North buy products from people in the developing countries in the South. It started as a kind of development tool. At the heart of the matter is the need to address unfair market conditions between Southern producers and the Northern consumers. It started towards the end of the 1980s in many different countries in Europe with very small initiatives based mainly on the political aspirations of development organizations, NGOs and church groups trying to find ways of purchasing product more directly from producer groups in the poor countries and, through this, creating a better income for them.

These things stayed quite small. Some people may have this picture of people in sandals, long hair and big beards buying solidarity coffee from Nicaragua. Others may have a picture of third-world shops. Some worked well, but some didn't work at all well. Mostly, these were special trade outlets for handicrafts and a few food products, but no fresh food. The fair-trade movement went on and has since entered the mainstream market, which is quite interesting, because in the early days, there was a clear idea of who were the good guys and who the bad guys were. The good guys were the small producers and the bad guys were the traders and the multinationals. Today, we work with Starbucks, Nestlé and Marks & Spencer.

Fair-trade is most active in the rich countries. In Europe, where the system was developed, fair-trade is strongest, but the United States of America and Canada are both

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<sup>30</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management

<sup>31</sup> In this article, "fair-trade" refers to the socially conscious consumer movement described here whereas "Fairtrade" refers to the organizations under the umbrella of FLO.



picking up a lot and Australia is doing well. Normally in each country there is one organization promoting the fair-trade concept, advertising it, finding partners, and working with what we call licensees. However, if you want to trade across borders, you cannot do that so easily, as everybody has developed their own standards and their own concepts. In 1997, these organizations came together to form an umbrella organization: the Fairtrade Labelling Organization (FLO).

The fair-trade movement is different from the organic movement. The organic movement went into hundreds of standards until governments had to take over and say: "We cannot work with that anymore; we have to protect the consumer." Fairtrade came together and said: "We will give up our own institutional programmes and join together to make one standard and establish one umbrella organization to look after the standards, develop the standards and do the certification."

Thus, another organization, FLO-CERT, was established. However, this created another problem, because when you go into formal certification, you have to separate that. This is an ISO requirement, so in 2003, the organization was divided again: we now have the FLO Association – FLO eV – and a certification body – FLO-CERT. The two organizations are physically separated: different buildings, different management, but we still talk to each other. While the Association develops the standards, FLO-CERT controls them. As well as that, there is a producers' support unit. They call it a business unit, which tries to develop new products and supports producer groups in achieving the requirements of the market. In FLO-CERT, we stay out of development and extension. We look only at producer certification and trade certification. The whole value chain has to be controlled. We have to ensure that the products that end up on the market as Fairtrade products are actually those which have been produced by our Fairtrade producers.

Fairtrade has developed very quickly, especially in the last ten years. This is largely because Fairtrade got out of the niche market, into the international market, and decided to work with major retailers. In 2004, the turnover was around US\$1 billion. In 2005, we had a growth rate of 37 percent, which is increasing every year. The market is not only growing quickly, but so also is the range of products.

In the beginning there was coffee. Coffee, coffee, coffee, and then came tea, and then more and more products. Fresh fruit is a very new product in the Fairtrade system. Looking at the demand side, different countries have different levels of penetration. Some countries, like Switzerland and the United Kingdom, are doing very well, and in other countries there is no Fairtrade at all, so there is still a lot of growth potential. In Switzerland, 50 percent of the bananas sold in the market are Fairtrade bananas, but in Germany, none. There is also some potential in the producer countries themselves: in Brazil and South Africa, interested and concerned consumers are now emerging.

At the moment, there are 574 producer groups certified, a number that is also growing very fast. We have a lot of applicants to deal with: last year about 300, which come partly with new products, but coffee is still growing.

We don't work with all products. At FLO-CERT, we work only with those products for which we have developed standards. We have product-specific standards: one is for small farmers' organizations and one is for those organizations that employ labour (plantations or factories). For coffee, we work only with smallholders.

Bananas are a huge product now in the Fairtrade system. Standards have been developed for fresh fruit and vegetables grown by small farmers. However, for plantations with hired labour, Fairtrade standards have only been developed for fresh fruit.

Fresh fruit started on a trial basis in 2002. It was a big task, not only for the small producers but also for the Fairtrade traders, because of the unprecedented demands on the value chain. While this area of our business is increasing in Africa, it is not growing in Asia. Although there is potential, most consumers are comfortable with their well-established conventional chains.

A few years ago, working with hired labour (plantations) was a no-no, but today, we are developing Fairtrade contract farming standards. In developing these standards, we have to look at the social development requirements. When a producer group applies for Fairtrade, we have to look at their development potential. Does it make sense for the consumer to pay a substantially higher price for a product to support its development? When we talk about small producers, how small are they? We have to define that and sometimes this is not easy. We do not work directly with individual producers but, rather, we work with producer organizations, normally cooperatives. They are not always called cooperatives; in some countries, cooperative is not such a good word. However, they are organized in a similar way to what we understand as cooperatives. They must be democratically organized, there has to be producer participation and they must be transparent.

Then we have a standard of non-discrimination and economic development requirements. We have two economic tools. One is minimum prices. Under Fairtrade, the farmer should always get a higher price or at least a sufficient return to recover the costs of production. Furthermore, there is a premium, but this premium is not for the individual farmer. This premium is for development activities. This is often a substantial amount of money: sometimes small producer organizations get US\$400,000 in the first year, so they must learn to do something with it.

The producer groups must be able to export. This is definitely a requirement, either by themselves or through a trader. We do not say any more that trade has to be directly from the producer to the consumer, especially for fresh fruit. You need professional people in between, but the farmer group has to show that they are able to export either by themselves or through a partner. We want to see the farmer organization developing and ideally becoming an exporter themselves or taking more responsibility for the commercialization of their product; for example, quality control or consolidation of the product, but they don't have to go to the last step of export.

Then we have environmental requirements. These are not organic. Sometimes people think Fairtrade is also organic. I have to say that a lot of Fairtrade products are organic

and these are also certified organic. Consumers who are socially concerned and who are willing to pay a higher price for Fairtrade products are often the same consumers who pay a higher price for organic product. If the producer group is not certified organic, we also have environmental standards. A lot of pesticides are forbidden. The producer groups must have an internal control system to show what pesticides have been applied, how they were applied and what impact, if any, that this had on the environment. It is a little bit like GLOBALGAP.

In cases where there is hired labour, like a tea plantation, we have to look into labour conditions. We work with the International Labour Organization (ILO). One big thing is child labour. We promise that a Fairtrade product is not produced with child labour and not with forced labour: labour rights and conditions must meet the standards.

Of course, we also have product-specific standards for fresh food. We need product-specific standards because we are looking into prices and we are looking into premiums. The fresh fruit standard is an example of how difficult this can become because every country has different prices, different production costs, different products and varieties. So what we have to do in every country and for every kind of product is to develop minimum prices and premium prices. There is a guaranteed farmgate price per kilogram, and there is a minimum free-on-board price. These differ depending upon how the producer groups are organized and according to the product. Then there is the premium, but this is not for the trader, or the individual farmer, but for the organization and their development activities.

DELEGATE: About ten days ago I was in Kabul and I met a person who was busy trying to develop fair-trade for some products there. I asked: "How are you going to meet the European sanitary standards, because Afghanistan isn't very clean?" This person tried to tell me that because they were going to get fair-trade certification, they didn't have to worry about these other standards. So first, I would like you to confirm that this is not true and, second, please tell me how you are going to get these people to understand that they have to be very serious about the sanitary issues to get product from Kabul to Germany?

MR ROSENKRANZ: There are a lot of NGOs working on the supply side and a lot of individuals and producers that do not necessarily reflect the official position of FLO. Often you meet someone who speaks about fair-trade that is not in line with us. Of course, fair-trade products must meet all the sanitary requirements to gain market entry. I think you can work with producers in Afghanistan, but you must work with your suppliers.

DELEGATE: Fairtrade is about establishing an emotional link between the poor farmer in the South and the rich consumer in the North. Why is it that consumers in the less-developed countries have not engaged into Fairtrade?

MR ROSENKRANZ: Fair-trade was initially about colonial products: product from the poor to the rich. However, it doesn't have to stop there. In many of the southern countries, consumers are becoming more concerned about social issues. But these markets are very small niche markets, not unlike what we experienced in Europe in the

1980s. There is also a problem of economies of scale. If you want to promote fair-trade in a country, if you want to have a national initiative, you must first sell a certain volume. Even in Thailand, there is a potential market for fair-trade products, right here in Chiang Mai. If you so wish, you can buy Fairtrade coffee.

DELEGATE: Should we have Fairtrade for farmers in the developed nations?

MR ROSENKRANZ: This is not what we stand for. This is not the image of Fairtrade. People buy Fairtrade product as a development tool.

DELEGATE: Is FLO the only fair-trade organization?

MR ROSENKRANZ: There may be other fair-trade initiatives, but FLO is the only one which is internationally recognized and provides higher returns to the producers. Some organizations have their own labelling and they label their own products. Some traders say, "Our product is Fairtrade" and they create their own fair-trade brand, but they don't have any external verification. Some organic certification bodies are trying something at a local level, but so far, the Fairtrade movement has stayed together. Most traders insist on the FLO label, because they say: "We don't want to split up like the organic movement."

CHAIR: Are there any controls on the use of the Fairtrade label by companies such as supermarkets, because it seems to me that Fairtrade is becoming primarily a marketing tool. I recently saw Fairtrade chocolate biscuits. My understanding was that the only Fairtrade component of that was the chocolate in the biscuits which was probably only about two percent of the value of the biscuit. What sorts of controls are there on the use of the Fairtrade label?

MR ROSENKRANZ: We have Fairtrade standards and there is a composite product standard. We have Fairtrade chocolates, but not all fair-trade chocolates are always Fairtrade. I don't actually know the figures, but the cocoa has to be from a Fairtrade source and also the sugar. I really don't know, but if it is a Fairtrade label product, I would think that at least 50 percent of the ingredients would have to be Fairtrade.

We do come from this idealistic niche path, very politically, ethically motivated, and we are working with the multinationals. There is a lot of discussion, especially within the Fairtrade system, and people are heavily divided on that. For example, Starbucks was for many people in the Fairtrade movement a target for anti-campaigning, but now we are working with Starbucks. Starbucks sells one or two percent of their coffee as Fairtrade coffee. They cannot sell more of that, because we will not allow them to make a statement that "All Starbucks coffee is Fairtrade". I have been inspecting several producers' groups which are delivering to them and they are very happy. They get the benefits. If we criticize them, we have to allow them to change. We have to allow them to become Fairtrade. We cannot say that we are exclusive, "We are the good guys; you are the bad guys. We won't allow you to become good." But, for sure, there is a danger of people using Fairtrade labelling to whitewash their reputation. At the end, it is the consumer's choice.

## **Fair trade as product differentiation strategy for market access: an exploratory study of honey producers in southern Brazil**

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### **Abstract**

*Fair Trade (FT) can be defined as a network established between producers and consumers with a strong element of mutual trust that binds everyone together. Nevertheless, the requirements for international trade are often codified by standards which are also imposed on producers. FT operates in parallel to the existing trading system. FT is an example of a set of private voluntary standards adopted in the agrifood supply chain. Clear rules, inspection and trustworthy certification are key points for FT assurance. FT can be considered a generic international quality assurance scheme defined and managed by independent standards organizations including the FLO. The literature on food standards has focused on two analytical approaches. The first and more dominant approach focuses on mandatory standards and international standards ruled by the World Trade Organisation (WTO). Most studies consider standards as barriers, highlighting the technical and managerial difficulties that developing countries face in compliance. The second approach emphasizes the opportunities provided by standards and how developing countries can use those opportunities to their competitive advantage. This is provided especially by private standards such as industry codes of practice, quality assurance schemes, organic and FT systems. The aim of this paper is to discuss some preliminary results of a research project assessing three groups of small honey producers from Southern Brazil. These producers are selected as being able to comply with FT standards. FT certification not only helps them to access international markets and consequently to gain better margins, but also to help their local networks of cooperative producers. As a result of the collective organization of farmers, transfer of knowledge in the form of good practice is transmitted.*

### **Introduction**

Significant economic, political and cultural transformations occurring since the 1970s characterize the increased integration of the world economy. The globalization of food chains illustrates a division of stages in production which are located at different sites. Diverse countries provide resources such as labour and raw materials that end up contributing to a final product. This network of commodity exchange binds producers and consumers across the world under the dominance of large agrifood transnational companies (Dolan and Humphrey, 2000; Farina 2002; Reardon *et al.*, 2001).

In recent years, the new trading paradigm of Fair Trade (FT) has developed and provided an alternative route to markets for food products coming from smallholders located in developing countries (Lewin *et al.*, 2004). The food industry has played an important role in the development of FT networks recognizing the need to obtain

sustainability through realizing the economic benefits that this can bring to businesses. In fact, fair trade operates parallel to the existing trading system. According to Barrat-Brown (1993), fair trade is in essence a network established between producers and consumers with a strong element of mutual trust that binds everyone together.

Fair trade is an example of a set of private voluntary standards adopted in the agrifood supply chain (Jones *et al.*, 2004). The role of clear rules, inspection and trustworthy certification are key points for FT assurance. It can be considered a generic international quality assurance scheme (Reardon *et al.*, 2001) defined and managed by independent standard organizations such as the FLO.

The literature on food standards has focused on two analytical approaches (Jaffee and Henson, 2004). The first and more dominant approach focuses on mandatory standards and international standards ruled by the World Trade Organisation (WTO) broadening the standards of developed countries. Most studies consider standards as barriers, highlighting the technical and managerial difficulties that developing countries face in compliance. The second approach emphasizes the opportunities brought by standards and how developing countries can use those opportunities to their competitive advantage. This is provided especially by private standards such as industry codes of practice, quality assurance schemes, organic and FT systems.

Although Brazil is an important international player, its food exports are derived mainly from large sized enterprises (Jank *et al.*, 2001). Nevertheless, as FT is about engaging smallholder producers in international trade, the aim of this paper is to discuss some preliminary results of a research project assessing three groups of small honey producers in Southern Brazil. These producers are selected as being able to comply with FT standards. The FT certification may not only help them to access international markets and consequently gain better margins, but also help their inclusion in local networks of cooperative producers.

This research involves three steps. The first step is to characterize these groups of honey producers, their practices and vertical or horizontal relationships using semi-structured interviews (associations, academics and members of the FT chain). Secondly, the paper identifies and proposes changes to their production practices which would enable them to obtain FT certification. Finally, the study critically analyses whether such certification really provides access to international markets and a premium price and whether the costs associated with obtaining certification are worthwhile.

### **Market access**

As a result of trade liberalization that culminated at the GATT Uruguay Conference and the emergence of the WTO, signatory countries have committed to reduce tariff protection, mainly in manufactured goods. This was possible due to the productivity of industrialized production growing steadily since the mid 1950s. Nevertheless, in that same period, the agricultural sector experienced a fall in comparative advantage, which is considered to be the root of the agriculture protection experienced today (Hayami, 1988).

More recently, in the Southern hemisphere, developing countries specializing in agricultural commodities have been forced to open their markets following the neoliberal wave of globalization that encompassed the world. However, in a period of liberalization, opposing forces to openness occur mainly from the developed countries that have either increased or maintained policies that continue to protect their agricultural sectors. This is the case of the Common Agricultural Policy in the European Union, the Farm Bill in the United States of America and farmer support measures in Japan, which ultimately distort commodity markets.

Distortion has many facets. The most common distortion is caused by production subsidies which result in overproduction. Such excesses end up in the international market causing agricultural commodity prices to collapse. Protection of agricultural markets can also take place in the form of restricted imports, thus limiting market access. Such a dichotomy in openness and protection creates tensions and imbalances and widens the gap between rich countries in the North and poor countries in the South.

With pressures mounting for the imminent liberalization of agriculture as a result of the long-awaited implementation of the WTO Doha round Article 13, tariff-based protection is under severe scrutiny. Nonetheless, industrialized nations are one step ahead and have introduced measures that will replace tariff protection with non-tariff protection. A series of food safety and product quality standards have been introduced into the European Union, the United States of America and Japan, to restrict market access for agricultural commodities from the less industrialized nations.

It is fair to say that industrialized nations have experienced many food safety scares such as Bovine Spongiform Encephalopathy (BSE) and outbreaks of *E. coli* 150, among many others. Thus, protection based on quality and safety standards that ultimately lead to credence by the consumers is something that is not constrained to governmental policy but is, in reality, of consumer sovereignty. A myriad of terms such as food safety, quality control, assurance, traceability and more recently origin, provide the consumers in industrialized countries with enough product attributes. However, it also raises the minimum requirement for producers in less industrialized countries that are dependent on agricultural commodities for their export earnings. Hence, market access is now controlled by private, national and supranational bodies (i.e. GLOBALGAP) that set the rules and provide certification that must be adhered to.

However, despite all the protection and market access difficulties, producers of agricultural products in the less industrialized nations find markets in developed countries attractive. Following Adam Smith's classical theory of trade, an exchange of goods takes place when there is a price differential between two nations.

### **The Fair Trade movement as an alternative to market access restrictions**

The Fair Trade (FT) movement has spread in the shadow of the tensions caused between the more industrialized and less industrialized countries with respect to market liberalization, openness, protection and limited market access for agricultural products. Fair Trade is understood as a new way of looking into a production and market system in an attempt to overcome market imbalances, especially for small farmers. It also tries to address issues of market access by creating specialist marketing channels and

networks that operate in parallel with the existing trading system. Nevertheless, in order for this to happen, the requirements for operating at the international trading level are often codified by standards which are also imposed upon producers. Thus, those engaged in Fair Trade have to follow basic principles, such as:

- direct purchasing from farmers;
- transparent and long-term trading relationships;
- agreed minimum prices;
- a focus on development and technical assistance through the payment of an agreed social premium.

For developing nations, the difficulties encountered in accessing high income markets can be solved in the short term by joining a Fair Trade network. In the case of small honey producers in Brazil, it works as an alternative strategy for producers organised in a cooperative-type structure. Hence, the extra hurdle in getting a product certified organic and under the Fair Trade banner is justified in the name of market opportunity, a differentiation strategy worth considering.

Since Fair Trade makes use of the conventional trading system, it uses “credence apparatus” to mimic the market practices closely. In the evolution of FT in agrifood products, the quest for product certification as a differentiation tool works, as opposed to the global undifferentiated homogeneous market.

Businesses such as the honey producer’s cooperative in Brazil that can capture these ideas and then communicate them to their consumers have been found to be more sustainable, and more successful in overcoming barriers and accessing different markets (Aguiar, 2006). To engage in either a mainstream or niche market strategy is about positioning a business to supply superior quality product either across the market or to a chosen market segment (Porter, 1985).

The FT market is still restricted to consumers that are sensitized by ethically driven demand. Such businesses offer products that are perceived to be socially responsible (Crane, 2005, cited by Harrison *et al.*, 2005). Here the ethical dimension provides enough differentiation for consumers to choose between businesses and products. In this sense, credibility in the way a good is produced and traded provides an alternative to industrialized products with high in-built technology that sometimes threatens social relationships, the environment, animal welfare and human health (Harrison *et al.*, 2005).

The high-income consumer in developed countries is reaching a point of saturation regarding product choice, especially if the product in question is of high value. Thus, there is a move in the market towards goods that provides an emotional connection. The case of FT honey from Brazil that can communicate naturalness, organic production and stories of the people who manage the bees will embody a sense of community that can diminish the barriers to market access. Nevertheless, as regulatory frameworks become more entrenched as a means of further defending markets in the more industrialized markets, producers will need to meet even more demanding requirements. Thus, considering FT as a differentiation strategy to access markets is not enough. Simply achieving product differentiation may not be enough. Eventually the consumer will



move on and therefore product innovation should continue to identify new ways of fulfilling consumer demand.

### Objectives

The aim of this paper is to discuss some preliminary results of a research project aimed at assessing groups of small honey producers in Southern Brazil. These producers were selected as being able to comply with FT standards.

### Methodology

The focus of this study was the State of Rio Grande do Sul, roughly the size of the United Kingdom. For the purpose of this study three areas were initially considered for the analysis as shown in Table 1. Area One (Osório) is located along the state's Atlantic coast where the population is less dense and the number of industrial units is very low. Area Two (Porto Alegre) is located in the capital city metropolitan area. Area Three (Sao Jerônimo) is located some 100 km west of the capital city. Areas One and Two did not qualify. Area One's non-qualification was due to seasonal labour conditions as a result of the summer months when the farmers and their families work in bars, restaurants and hotels to supplement their annual income. Area Two, characterized by the green belt area of the capital city, did not qualify due to not complying with the Fair Trade + Organic certification requirements. Hence Area Three served as the base for this study.

**Table 1: Areas of Study**

Areas	Municipalities	Total honey production (kg, 2004)
One – Osório	22	171 484
Two – Porto Alegre	22	137 931
Three – Sao Jerônimo	9	160 000

Data was collected by the means of a survey using face-to-face interview technique. Further rounds of group discussions with honey producers were carried out to deepen the issues raised from the questionnaires.

### Discussion

Brazil is the 15<sup>th</sup> largest honey producer in the world. In 2004, Brazil produced 32 290 tonnes (IBGE, 2004), and has since become the 5<sup>th</sup> largest honey exporter (FAO, 2005) and there is still scope to increase production. The Southern part of Brazil where this study was undertaken is responsible for 47 percent of the country's total production, with the State of Rio Grande do Sul alone being responsible for producing 7 317 tonnes of which 1 691 tonnes were exported (Table 2).

**Table 2: Honey production, exports and domestic consumption in Brazil from 1999 to 2004**

	2000	2001	2002	2003	2004	2005
Production (tonnes)	21 865	22 220	23 995	30 022	32 290	40 000
Domestic consumption (tonnes)	21 900	20 000	11 400	10 800	11 300	na
Exports (tonnes)	269	2 489	12 640	19 273	21 029	14 500
Average price of exports per kg (US\$)	1.07	1.13	1.83	2.36	2.02	1.31

Source: Based on data provided by FAO (2005) and IBGE (2005)

Until 2001, the majority of honey production in Brazil was consumed internally. However, since then, Brazil has progressively increased its international market share by getting access to more added-value markets.

The FT certification may not only help them to access international markets and to gain better margins, but also help their inclusion in local networks of cooperative producers. Following Nicholls and Opal (2005), as a result of the collective organization among farmers, transfer of knowledge in the form of good practice is transmitted, which helps the process of upgrading.

This paper focuses on Rio Grande do Sul, the Southern-most state of Brazil. This state is responsible for producing some 25 percent of Brazil's honey. The honey production derived from this region is typically of small- and medium-scale enterprises that generally employ family labour in small farmsteads.

Although the export of honey from Rio Grande do Sul is undertaken primarily by three specialized companies which purchase honey from a network of small producers, this study attempts to unveil the means to engage smallholder producers in international trade by qualifying them to engage in Fair Trade marketing.

According to the Brazilian Secretariat for Family Agriculture (Ministry of Agrarian Development, 2006), most family honey producers own up to 50 beehives. For a honey producer the number of beehives and income are directly related: the greater the number of beehives the more likely honey production is to be the main source of income. In the past ten years, honey production has doubled. This has been achieved as new honey producers commence beekeeping activity with small numbers of beehives. This relationship is highlighted in Tables 3 and 4.

These numbers show that honey production is an activity where scale is a key point. Small producers need to add value to their products to be able to receive a better income and to sustain their livelihoods. Next we will argue how FT and organic certification may be considered as strategic options to honey producers.

**Table 3: Honey production costs (100 Beehives)**

Total Annual Cost (R\$)	3 766.77
Sale Price (R\$/kg)	1.40
Production (kg)	3 000.00
Total Revenue	4 200.00
Cost Price (R\$/kg)	1.27
Profit (R\$/kg)	0.13

Source: Embrapa (2003)

**Table 4: Honey production costs (350 Beehives)**

Total Annual Cost (R\$)	9 786.70
Sale Price (R\$/kg)	1.40
Honey Production (kg)	10 500.00
Total Revenue	14 700.00
Cost Price (R\$/kg)	0.93
Profit (R\$/kg)	0.47

Source: Embrapa (2003)

### **Certification**

In order to participate in FT and to capture the consumer demand in the ethical market in developed countries, the product must not only comply with the FT principles, but also be of organic origin. Thus the formula Fair Trade + Organic (FT+O) puts an extra hurdle on producers.

The Soil Association in the UK (2005) states that in order to qualify for organic certification, apiaries must be sited on organically certified land, and must have ample access to natural nectar, honeydew and pollen sources. In addition, hives should be situated within four miles of:

- uncultivated areas of natural vegetation;
- organic crops;
- crops have been managed under low environmental impact under EC regulation 2078/92;
- bees must be kept away from sources of contamination such as urban centres, motorways, industrial areas, waste dumps and incinerators.

The standards for organic honey production restrict the producer to specific areas in regions that will qualify for certification. Nevertheless, beekeepers of Area Three have a multifunctional characteristic typical of their small holding structure. This has proven to be a challenge to organize farmers into associations in an attempt to spread the costs of certification as seen in Table 5.

**Table 5: Fair Trade certification costs**

Quality	Number of members	Fees (€)
A	< 100	2 000.00
B	101 – 500	2 200.00
C	501 – 1 000	3 000.00
D	> 1 000	3 400.00

If a group of producers have their own processing plant, the following additional fees will apply, as shown in Table 6.

**Table 6: Additional fees for smallholder processing plants**

Quality	Number of members	Fees (€)
A	< 10	200.00
B	10 – 100	400.00
C	> 100	600.00

### Pricing

Honey prices also depend on the quality of the final product. According to the FLO, honey quality is calculated using two criteria: percent of water in the honey – humidity, and presence of Hydroxymethylfulfural, which generates a points system.

Fair Trade organizations are committed to offer producers a price that covers all production costs. In addition, prices should also provide comparatively good remuneration for labour, thus providing members and their families with adequate living conditions. Producer organizations should also receive a percentage of the prices to cover their supporting services to beekeepers, as well as other social development activities within the community.

Table 7 shows the prices and the premiums paid for honey at the time of this study. In cases where the market price in a producer country rises above the FLO minimum price, the premium prices disappear and the spot market price would then be exercised (Fairtrade, 2006).

**Table 7: Prices for Fair Trade honey**

All producing countries	US\$ per kg				
	Fair trade minimum FOB price	Fair trade Premium	Total Fair trade price	Organic differential	Total Fair trade Organic price
A Quality	1.80	0.15	1.95	0.15	2.10
B Quality	1.65	0.15	1.80	0.15	1.95

Source: FLO (2006)

## Results

The preliminary data from the group of honey producers selected suggests that there is a need to adapt some technical standards and implement some improved management of beehives so that quality can be improved to qualify for FT certification. The current average productivity is 18 kg of honey per year per beehive. There is significant scope to increase production to 60 kg of honey per year per hive. However, for the whole group of producers to meet the certification requirements, the social standards imposed by the FLO will have to be better understood and evaluated. Fortunately, our analysis shows that there are no technical restraints for these honey producers to comply with the standards imposed by the FT system. However, honey producers will have to bear the costs of certification which can be very high for such small scale production.

Another question that arises from our analysis is that although the FT system may empower these producers to access markets, the mechanisms that would allow these producers to grow are not clear. Some critics say that for the FT system to perpetuate, it requires the rich country–poor country relationship to be maintained. Following Aguiar (2006), this reinforces the notion that “breaking the colonial pact and dependency is the root behind fair trade initiatives. Nevertheless, as paradoxical as it may seem, such a pact is in earnest reinforced and perpetuated by Fair Trade certification bodies.”

The analysis of the group discussions shows that being certified by FLO would bring larger margins. Nevertheless, it will not guarantee an improvement on managerial or technological practices, and in fact would maintain the producer’s small size.

When asked about this issue, FLO officials argue that Fair Trade certification provides training and information for producers to access markets. They affirm that small producers will not be able to develop these skills without the technical assistance they provide. As a result, FLO is the agent governing the chain, establishing who will be included or excluded of the “fair trade system”.

The preliminary results also suggest that there is a risk of becoming increasingly dependent on the export market, specifically the European Union ethical consumer eager to consume less developed world imageries. These findings support Leclair’s (2002) concern that the fair trade system relies upon the goodwill of a small group of consumers. Within the developing countries, there is no domestic or alternative market that will pay more for social and ethical standards. These honey producers would incur high risks to become overspecialized and extremely dependent upon a niche market.

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## **Geographical indications: concepts and implementation in Thailand<sup>32</sup>**

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### **Abstract**

*This article presents the principles of geographical indications as implemented in Thailand. A geographical indication (GI) is a quality sign protected under national intellectual property law, which enables producers to differentiate their produce by linking it to their geographically specific agro-ecological environment. Proof of a scientific relationship between the geographical characteristics of the production location and the produce must be delivered for a new geographical indication to be created. The careful definition of the geographical delimitation of the GI and of the terms of references for the production and processing practices are very important to allow an unequivocal use of the quality label by producers within the area protected under the GI.*

Before I go to my slides, I would like you to think of an example. When you buy a bottle of wine, apart from the brand, you think about where the wine has come from. In Thailand, usually people think of wine from France, from Bordeaux, or from some other famous region in France, Italy, Spain, or even from Australia. The location, region or area has an influence on the perceived quality of the product. The GI, or geographical indication, is a mark or a sign which indicates this link. When you use the name of the region with your product, it indicates or sends a signal to the consumer, to the buyer, that the product originates from that geographical origin, and has some specific quality characteristics.

In Thailand, pomelos from the Nakhonchaisi region are quite famous. They are famous because the texture of the pomelo is very good. The fruit is very juicy and very sweet and people are willing to pay a higher price to buy this product than a pomelo from other regions. Similarly, in Chiang Mai, there are quite a few GI products: for example, coffee from Doi Tung. The coffee from this region is of excellent quality.

Geographical indication, in a sense, is a kind of intellectual property. Thai people usually think of copyright, British people think of patents and Indonesian people might think of trademarks. GI is a unique intellectual property, different from other kinds of intellectual property, because GI is a sign that belongs to the community rather than to individuals. Therefore, it is not assignable. You cannot sell this sign to someone else. The sign belongs to the community and to the producers in that area.

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<sup>32</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management



To get the GI registered, you have to meet certain criteria. You have to be able to show the Department of Intellectual Property (in Thailand), that your product has a specific link to the region in terms of quality, in terms of character and in terms of reputation.

In 2003, we enacted the law on Geographical Indication Protection to give proper protection to this sign. This law prevents any misleading use of the sign. That simply means that if your products do not come from the specific region which is indicated on the label, you are not allowed to use that sign.

The sign itself may not only be a symbol, it could be a name. It could be something else which can refer to that region, but most of the geographical indication signs that have been registered with the Department of Intellectual Property are names of the regions; for example, Nakhonchaisi pomelos or Doi Tung coffee. Some of those that are in the process of being registered include Hom Mali rice from Ubon Ratchathani, Phrae Wa (Thai silk) from Kalasin. So the geographical indication is usually the name of the region which is associated with the product.

However, these are some legal considerations. The geographical indication which can be registered must not be a generic name. For example; when we say Chinese tea, Chinese tea is not, or does not, necessarily mean that this tea is from China. Rather, it indicates the type of tea and the way people drink the tea. Furthermore, you cannot just simply register the word pomelo as your geographical indication, because it is the common name for that kind of product. You would have to link it with the geographical name. Then, the name which will be registered as a geographical indication must not contravene public order, morality or public policy.

Geographical indications can be used with agricultural goods, industrial goods, or even with handicrafts. Some examples are; Jasmine rice from Thoong Gula Rong Hai. Thoong Gula Rong Hai is an area in the northeast part of Thailand. This area covers five provinces; pomelos from Nakhonchaisi; and salted egg from Chaiya. However, salted egg from Chaiya is not a good example, because there are different groups of people in that area and each of them have their own method of producing salted eggs, so there is some doubt as to whether the product is generic.

Industrial products include, for example, wine from Phu Rua Chateau and Phrae Wa silk. This is very famous because of the texture, the pattern, which is very unique, and the way people make it. The local people have a specific way to make this kind of silk. For handicrafts, earthenware from Koh Kret is very famous. Koh Kret is on the outskirts of Bangkok and is a tourist attraction as well.

To register a GI, people cannot simply think of a name and then file an application. They must first undertake some research. This begins with a meeting among interested groups. The applicant must then demonstrate that the product has some link with the region. This means that if the same product is grown somewhere else it will not produce a product with the same characteristics. The applicant must then specify the process by which the product will be produced. You have to indicate how you will grow the product, how you make it and the process of maintaining the product. If you think about a pomelo, you have to specify the area. You have to specify the breed, the variety, and

the process of picking the produce and transferring it from one place to another place in order to be able to control the quality of your product.

Because geographical indications belong to the community, every producer and every interested party in the region has to come together. When you draft your application, you must have certain control mechanisms in place so that when the authority examines the application, they know that your product possesses certain standards that can be verified and traced back to the origin. The most important aspect is that your product is distinctly different from other products of the same type. Because it is a geographical indication, you must provide a map indicating the area in which the producers can grow the product and be qualified to use the geographical indication sign.

You must provide some scientific proof as well. For example, the aesthetic appearance of your product, how it looks when it is ready to be picked from the tree, and when the consumer buys it, what it should look like. This kind of thing conveys a message. The sign that you use with your product will convey the message to the consumer that your product is ready to be consumed and is in perfect condition, and it meets certain standards which you specify in your registration. To ensure that the consumer gets good quality product, you have to control things right from the beginning. The control system will consist of many registered producers, an internal control plan and an external control plan.

DELEGATE: In your outline of registration, you have a production process within that system. Who will certify the production process? A certification body, or your department?

MR EKKAYOKKAYA: It depends on the type of product. For an agricultural product, the Ministry of Agriculture helps to certify the link between the product and the land, or the area. If the applicant believes that there is some link between the quality of the product and the land, they must provide scientific proof. This will be checked and verified by the Ministry of Agriculture.

DELEGATE: In the case of Surin province, which is near Cambodia and produces a similar quality of rice to Hom Mali, what measures are in place to ensure that this product is Thai and not Cambodian?

MR EKKAYOKKAYA: As far as I understand, the area in which Hom Mali rice is grown in Surin province and Cambodia are not right next to each other, but at least 100 kilometres apart. The land between these areas – in both Cambodia and Thailand – is slightly different in terms of the soil condition and the character of the atmosphere which influences this particular type of rice. The technicians say they can trace the origin by DNA fingerprinting or something like that, which can give you a certain idea that the rice from this region is different to the rice from another region.

One of the important things about geographical indication is that it is not only the character or the specific type of the plant which is important for registration, but also the reputation attached to it. Certain products can come from a nearby region, but they have a totally different reputation. This is because of the quality control and the history

associated with the product itself. Certain products, for example, grilled pork from Trang province, the method of grilling the pork could be carried out anywhere in the world. It could be done in Bangkok; it could be done in Chiang Mai, but the reputation which is attached to the product is not the same, and the history associated with it is not the same. Its origins date back 80 or 100 years. I can't remember how this grilled pork came about, but it does have a history which is shown in the registration and in the application. So grilled pork, the same grilled pork, but from a different region, would not attract consumers at the same level. That means if you are a consumer and you are going to pay for the genuine grilled pork from Trang, or grilled pork from some other province, you have to think twice whether it is worth money paying for that or not. You are not sure whether the quality is the same, even although people will assert or allege that their pork has the same quality.

DELEGATE: Who specifically is certified? Is it the farmer himself who can put the sticker that his pomelo is from Nakhonchaisi, or is it the community who can put the sticker on it?

MR EKKAYOKKAYA: The producers, but the producer must be registered first. They have to become part of the association or must prove that they can verify that the process complies with the standards confirmed by that body. When they are able to show that, they are entitled to put the sticker on by themselves.

DELEGATE: In other words, if my pomelo is from the geographical area, but my soil is not brown and does not meet the acidity range or the pH, I will not be allowed to be a member of the association, and then I will not be able to get the sticker? Is that how it works?

MR EKKAYOKKAYA: Yes, but the applicant has to verify first and specify the area which can grow this pomelo. If you are in that area, this means your product will be qualified to have this sticker attached to it. However, if you are not in that area or your area of land has a different type of soil, this means the application is wrong. You have to amend the application.

DELEGATE: If for example, the variety of pomelo that a farmer grows is different, can they still attach a sticker?

MR EKKAYOKKAYA: Yes, if that variety was part of the registration or application. You have to specify the variety of the pomelo first that are permitted.

DELEGATE: Firstly, I would like to add that the geographical indication is not related only to the geography, the location or the reputation, but also to the traditional way in which the product has been produced. My question is that you should clarify who can be the applicant to register the GI product? Who has the right to use the GI sticker on the product? How long does it take you to certify or to prove that a product has a specific characteristic and that it should be a GI product? How much does it cost?

MR EKKAYOKKAYA: In law, there are three groups of people who can apply for geographical indication registration in Thailand. The first one is a government authority

responsible for, or related to, that product; for example, the governor of the province. He is entitled to file an application on behalf of the producers or farmers who produce the product in that area. Secondly, the producers or the manufacturers themselves may apply, and thirdly, it is the consumer. Consumers are not often the applicant, because the consumer usually does not know how the product is produced. I totally agree with you that in the application you have to provide some information regarding the tradition which is associated with the product.

DELEGATE: What about the person who has the right to use the GI? For example with Rattan products, when rattan is grown in a province but transformed in other communities, for example in the city, do the latter also have the right to use the GI?

MR EKKAYOKKAYA: Yes, they do have the right, not only producers from that area, but any business people in that business circle, like the person who received the product and transports it to sell in another area. You can use that sign, you can use the geographical indication for the product, but not producers from other regions.

DELEGATE: Normally, how long does it take you to prove that it is a GI product?

MR EKKAYOKKAYA: It depends on the type of product. If it is a plant which has, for example, a one-year cycle, you probably need one or two years to prove that, because you can prove the link only one time a year, so you have to wait until the next crop or the next cycle comes about. The next year you can double-check your produce to make sure that there is a link between your product and the region, but again it depends on the product. Some products are harvested every two or three months, so in this case, the certifying period is shorter.

## Traceability systems applied to FFV export chains in Thailand<sup>33</sup>

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### Abstract

*Traceability systems operating in fresh fruit and vegetable (FFV) export chains emanating from small-scale farms in Thailand were analysed. Interviews with chain actors revealed that key export markets for Thai FFV are demanding product traceability. These demands are driven by issues such as food safety, and brand or market protection. In general, FFV traceability systems in Thailand are in their infancy with most of the small pack houses not able to trace produce reliably. However, about five larger pack houses can demonstrate effective use of a traceability system. Hurdles to adopting traceability solutions relate to the nature of the supply chain, lack of awareness and limited resources. Lessons learned from the firms operating successful traceability systems include the need to shorten the traditional supply chain, to employ contract farmers and to be prepared to commit considerable resources in developing the system. In many cases, data may not be reliably collected and stored; when it is, there are invariably differing data collection practices and proprietary information or identification systems. No single solution has the capability to provide an effective one-stop solution to traceability of FFV in Thailand. The key is judicious selection of a basket of approaches customized to meet the needs of a particular situation. A successful approach to traceability of FFV in Thailand is briefly summarized to illustrate solutions on how to deliver the required level of traceability and associated information at an acceptable cost.*

From the outset, I must stress that this presentation is about the traceability of fresh fruit and vegetables. What I have to say does not apply to other sectors such as chicken, shrimp and seafood. Fresh fruit and vegetables are very, very different as we will soon see.

Traceability is about a series of mechanisms by which we identify and prepare data, collect and store data. As produce flows through the supply chain, records are added at every stage and we keep a history of where the produce has been and where it is going. Traceability is about a product knowledge framework and in many cases we see parallel traceability systems. At a very basic level we can see where the produce has come from, when was it harvested and where it is going. However, an increasing number of buyers and an increasing number of markets require more detailed information. Here traceability refers to other information such as fair-trade, organic and other credence attributes. As a result, we often have two levels of traceability and thus two levels of documentation.

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<sup>33</sup> The following paper is an edited transcript of a presentation delivered to the International Symposium on Fresh Produce Supply Chain Management

Many of the key markets for Thai fresh produce require traceability; principally Europe and Australia. Some of the Thai fresh fruit and vegetable exporters are responding to this need. I say “some”, but not all. Probably only five or six companies in Thailand at the present time can provide comprehensive traceability systems. The other 60 or so packing houses cannot do this. So, essentially, traceability for fresh fruit and vegetables in Thailand remains in its infancy.

There are many reasons for this. The number one hurdle is the lack of awareness of the need for traceability by the firms, but there are also other barriers to the implementation of traceability imposed on the packing houses and the exporters.

When we talk about traceability, we talk about varying three parameters: the breadth (how much information we need to collect); the depth (how far back we need to go); and the degree of precision or accuracy. All of these vary in Thailand. Traceability on its own does not assure the safety of a product, but it is one of many tools in a bigger scheme. If we want traceability to contribute, if we want to have a safe product, we have to have a robust quality management system in place. We need to have robust good agricultural practices (GAPs) and we have had lots of discussion about GAP in Thailand and the rest of the region. Without these systems, tracking is not going to guarantee the safety of the product.

We also need commitment from the chain members. No one is going to commit time and effort if there are no benefits; the farmer needs to realize benefits; all the supply chain actors need to realize benefits, because without benefits, there is no commitment.

At the end of the day, traceability provides a perception of food safety, but without the underlying mechanisms in place, it does not guarantee food safety. If we look at the key markets in Thailand requiring traceability, we see that there are variable drivers. In Europe, the main driver is risk management and liability legislation, being able to demonstrate due diligence and to manage a recall efficiently. However, we also see the market becoming more differentiated and the increasing need for producers and food manufacturers to provide evidence of a substantive claim, a credence claim, and productivity gains. Knowing your supply chain allows you to improve your supply chain. So, for an exporter in Thailand, we may see some or all of these drivers being the reason why a buyer requires traceability. This obviously drives information needs and drives the type of traceability system at the end of the line.

Into the European Union (EU), we obviously have due diligence. We have the General Food Law Regulation Article 18 that came into effect in 2005/2006 and we have retailers wanting to protect themselves; and the retailers, in turn, are cranking up the requirements. A lot of the buyers are requiring complete chain traceability. In Australia, the main driver is productivity gains. There is legislation there, but I would say that it is not yet the main driver.

If we look at exports of Thai produce, most fresh fruit and vegetables from Thailand are going to other Asian countries. These do not require traceability. Most of the buyers within the region will accept the Thai Government food safety programme. Now let's look at the other markets: the EU or Australia – Australia is just a small importer, but it

does require traceability. Into the EU, many of the buyers are requiring third-party or private certification, principally GLOBALGAP, but we also have in-house schemes like Tesco's Nature's Choice and British Retail Consortium (BRC).

Talking to exporters, we see that even into Europe, when there is a supply crunch, a lot of the smaller importers waive the need for traceability. Even though we have strict regulations in Europe, when I talk to the small exporters, the need is often waived at times.

Price continues to be the principal factor in many cases. Putting it into perspective, the EU is not a main market for Thai fresh fruit and vegetables. Asparagus is probably five percent of total exports, baby corn about ten percent. Both are high-value markets, but not high-volume markets.

When we look at traceability, we need to understand the chain structure in Thailand. The Thai fresh fruit and vegetable sector is composed of many smallholder farmers. For example, baby corn farmers generally cultivate only 0.8 to 1.6 hectares; asparagus farms are 0.24 to 0.32 hectares, with asparagus grown on maybe 800–1 200 m<sup>2</sup>. Some supply chains are deep and in nearly all cases – 99 percent of the cases – the farmers will be linked to the market through collector agents and other intermediaries. We all grumble about the intermediaries, but they do provide assistance. Some estimates tell me that on average, fresh produce in Thailand will be handled seven to nine times from the farmer to the packing house. In exceptional cases, this can go up to 14 times. Think about the implications of that in tracing the quality of the product.

Nevertheless, I am going to be positive. We have spoken with several exporters and we have tried to identify some of the factors which help them to implement traceability. One of the key factors is contract farmers. Of the five or six firms who have traceability systems, they all use contract farmers. They all have very, very short supply chains, maybe just a single collector agent or no collector agent at all: the firm will collect for themselves. They are very flexible in their approach and require a minimum of data entry. Each of these firms has a strong commitment to train the farmer and the collector agent. In many cases, the grumbles come from the collector agents who are much harder to train than the farmers. Furthermore, these firms tell me it may be five years before you can have a traceability system you are comfortable with. Obviously, there is a considerable investment in both time and money.

It is important that we set realistic targets. How many farmers will I have? What will be my degree of traceability this year, in two years, in three years? We must create a solid foundation from the outset. I have labelled this slide *Success of traceability ensuring food quality and safety*. It could also be *Failure of traceability*, but I thought this was a nicer title.

As I said before, tracing fresh fruit and vegetables by lot does not ensure food safety. It must be linked to an effective food control system. We need to get our food control systems and our GAP programmes in place. If a traceability system is going to be effective, it must be reversed and I would say, with the exception of the five or six top companies, this is seldom the case. Some packing houses do not have a traceability

system, others have, but not for all the produce. They claim that they can trace maybe 90 percent or 85 percent of their produce.

Across the industry, the adoption of food traceability is low. Many firms simply do not have a traceability system. There is a lack of farmers who are capable of entering into a traceability system. All farmers can, but first they must be trained. When we look at traceability for most of the small packing houses, we would only be able to trace back to the collector agent, not to the individual farm. This obviously has implications for product recall. Even for those firms which have reverse traceability, we are down to maybe the farm level or occasionally the plot level, but not to the input level as yet (seeds, fertilizers and chemicals, etc.).

Quality of information, record keeping, and the authentication of records are areas which need a lot of work. Records are invariably kept on pieces of paper. In many cases, there is no formal record keeping system. In a recall situation, this will obviously create significant delays. Again, in many cases, as farmers harvest their produce and send it through the collectors, we only see little pieces of paper attached to the product to identify the farmer. These pieces of paper get lost, they get destroyed through the system, and as the consignment moves through the system, we see a mixing of consignments. Again, this is the collector–intermediary syndrome. They don't understand what traceability is. They have one basket which is too full, one basket which is a little bit empty; "Let's put this product into this basket. It's easier to carry."

We come to a tricky one here: transparency and corruption. We have to have chains which are wholly transparent and not corrupt. We have to trust.

If we look at some of the reasons for the failures and if we look at some of the most significant barriers, number one is the lack of awareness. What is traceability and why do we need it? What is the purpose? What are the benefits for me? Once we get over the lack of awareness of what traceability is, we come to the next hurdle which is what is traceability? It is not something which is difficult, but the perception is that it is very, very difficult; "I can't do this. It's not for my farmers." Supply chain structure is going to be a huge hurdle in Thailand.

Another barrier is that some of the bigger pack houses are serving different markets, and different markets have different buyers with different requirements, and this reduces our resources somewhat. Many firms are dealing with multiple buyer schemes: Tesco's Nature's Choice, BRC and GLOBALGAP. This creates problems in creating a traceability system because it must accommodate all of these buyer schemes.

Information quality; getting people to give good-quality real information is an issue, just as data transmission and storage is problematic. With the exception of the main companies everything is on paper. What is more, language interpretation is always an issue in Thailand.

Most of the fresh fruit and vegetables going to Europe will be airfreighted. The produce goes to the airport in cartons. The packing houses cannot pack into Unit Load Devices



(ULDs) because produce is regularly thrown off planes. If the plane is full, your produce is thrown off.

A huge problem if we want to have a much broader traceability system is that we don't have a farmer identification scheme. Farmers do not have their own identification number. They have their ID number, but we don't have a farm identification number. Incidentally, we don't have a packing house identification number either.

From talking with packers and talking to farmers, two questions are raised repeatedly. "Will requirements for traceability exclude Thailand from some export markets?" The answer to that is yes. It's happening already. That leads onto the next question which I want to leave for you to think about, "How does this affect the smallholder farmer?"

If I look at the big firms who have reverse traceability systems, I see that in all cases they have adopted bar codes, certainly in their internal operations. They have all utilized a proprietary coding system to synchronize and to trace their buyers effectively. These systems were created partly because of a need to serve different markets and the need to adapt to the different buyers' certification needs. They do have effective recall, but the weak link is airfreight. All of these firms are sending out mixed consignments. So, in one carton you may have asparagus, baby corn, or whatever, and small quantities. There are no containers.

### **The KC Fresh case**

To reinforce and illustrate the major points I have made, let me introduce the KC Fresh company. Their produce is mainly exported. Their key market is the United Kingdom. They employ contract farmers. Some of their contract farmers are GLOBALGAP-certified, some practice GLOBALGAP, but are not certified. There is a cost issue here.

The packing house has worked with the farmers to assign a farmer code and a plot code. They look at minimum production units. They have also created their own farmer coding system, a lot coding system, and carton despatch codes. Their IT system is developed to support the different third-party quality systems.

Looking very briefly at their supply chain, they have about 200 or 300 contract farmers. They use collector agents; each collector deals with about 30 farms. Then we have the packing house, loading at the airport, and loading at the destination, through an importer, and finally to a retailer who is operating a GS1 system of supply chain standards.

If we look at the Thai side of the operation, farmers are responsible for growing and harvesting the produce. They are also responsible for farm management records, completing a delivery note when they harvest the produce and for labelling the produce baskets. The packing house supplies the baskets. On the side of the baskets there is a little plastic strip on which the farmer can write the information, so no more little pieces of paper.

The purpose of the collector agent is to move the produce from the farmer to the packing house. The collector agent does nothing else, and the collector has been trained to do nothing else. He or she collects the produce from the farmer, collects the delivery note, and moves the produce and delivery note to the packing house. The collector's number one role is to maintain consignment integrity and not to lose the delivery note.

On receiving the produce, the packing house assigns a raw material number or a lot code. It then processes and packs into cartons. Each carton will be assigned a carton despatch code and, on the database, the contents of each carton will be described. So, we will have a number of raw material codes for each carton. All of this information is entered into a database which can be accessed by the buyer over the Internet. They are then despatched to the airport in containers, not in ULDs.

One of the key success points for this company is minimal data entry early in the chain. Farmers only mark the baskets and no data is entered by the collector agent. There is extensive training for the farmers and the collector agents and an online dating system is accessible by the buyer. They have a very strong packing house–supply base relationship. The packer supports the farmer through GLOBALGAP certification – they pay for this – they provide the training, they provide the preparation, helping the farmer and creating farmer records so the farmer can fill it in for themselves and assigning farmer plot codes.

To make this work there is a huge commitment. If we want to replicate this through the industry in Thailand, how do we get such a commitment from the smaller pack houses?

## **Current research, development and technology transfer efforts to improve quality after harvest of semi-temperate vegetables in the Philippines**

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### **Abstract**

*The paper highlights the current research, development and technology efforts that are done by different agencies involved in improving the quality after harvest of semi-temperate vegetables in the Philippines. Quality assessment studies include selected vegetables stored and transported in a cold chain environment and contamination in selected vegetables after harvest. A study also found out the financial viability of establishing a cold chain system for semi-temperate vegetables in the major semi-temperate vegetable producing region in the Philippines. Economic analysis of transport by refrigerated trucks showed a higher internal rate of return and a lower payback period than the unrefrigerated transport. A market research on high value vegetables was also done to establish baseline information on vegetables being handled and to evaluate the existing post-harvest systems in the Cordilleras, the major production area of semi-temperate vegetables. Other related studies include the inflow and outflow of vegetables and the current post-harvest handling and the sources of losses. Efforts for technology transfer include the commitment of the government to establish cold chain systems on major vegetable routes and continuing capability building activities for various stakeholders in the vegetable industry.*

### **Introduction**

Semi-temperate vegetables are the types of vegetables that can be grown in relatively higher elevation areas. Production of high value crops like these vegetables in the Philippines has vast potential. The Philippines has large tracts of fertile lands for cultivation of semi-temperate vegetables with high market demand. These vegetables include lettuce, cabbage, broccoli, cauliflower, bell pepper, celery, carrots and potatoes. Despite the high returns in growing these vegetables, growth and development of the industry were hampered by post-harvest losses which can range from 40 to 60 percent. Quality deterioration of these perishable crops continues due to inefficient handling and lack of infrastructure to bring the fresh produce to distant markets.

Key production areas of semi-temperate vegetables include the Provinces of Benguet, Mountain Province, Nueva Vizcaya in Luzon and Bukidnon in Northern Mindanao. The bulk of the produce goes to commercial centers like Metro Manila and Baguio City.

A number of research and development efforts are being conducted to address the improvement of quality of semi-temperate vegetables after harvest. An intervention effort to improve the handling of semi-temperate vegetables is being established by the Department of Agriculture through the National Cold Chain Programme.

The paper highlights salient findings of research, development and technology transfer efforts done by various institutions on improving the quality after harvest of semi-temperate vegetables.

### **Research and Development efforts**

#### **Quality assessment studies**

A series of shipment trials of vegetables e.g. lettuce, broccoli, cauliflower, was conducted to evaluate quality changes under existing cold chain conditions. Various packaging materials were likewise investigated to determine loss in weight and final quality. Results showed that a 2.5-hour delay in precooling caused significant change in visual quality of lettuce after a 36-hour journey from Cagayan de Oro to Manila. However, no significant weight loss is observed in precooled or delayed samples (Gibe *et al.*, 2005).

Another study conducted by the Bureau of Post-harvest Research and Extension (BPRE) assessed the contamination of semi-temperate vegetables like broccoli, cabbage, cauliflower, cucumber and carrots coming from Benguet, the primary producer of these vegetables. Results of pesticide residue analysis showed traces of organophosphate residue but very much below the approved maximum residue limits. Results also showed presence of carbamates in some samples but these were not alarming because they were very low (Gragasin *et al.*, 2006).

#### **Potentials of cold chain systems**

On the other hand, a study done to determine the institutional buyer preferences for semi-temperate vegetables focused on such attributes as freshness, size, colour, maturity, uniformity, variety, origin, labeling and form. Vegetables produced in the Cordilleras which have potential for the use of cold chain system include broccoli, carrot, bell pepper, lettuce, cauliflower, snap beans and sweet peas. Some requisites for the successful implementation of a cold chain system include clustering of farms, production organization, market linkages, information dissemination on the importance of cold chain system, proper production and postproduction practices on the part of growers and traders (Ramos *et al.*, 2005).

Results of the feasibility study showed that investment in the technology is financially viable. Benefits that are derived include maintenance of quality and increased proportions of marketable volumes due to loss reduction. Consequently, better quality and premium prices would accrue to producers as higher income, relatively stable price and fair price of vegetables in the market (Ramos *et al.*, 2005).

Another study was conducted by BPRE to evaluate the viability of a cold chain system for transporting lettuce from Bukidnon (Mindanao) to Metro Manila. The cold chain system is important for the Mindanao growers to market to Metro Manila. However, the profitability of transporting lettuce is threatened by increasing costs of handling and transport services. The existing setup, volume and handling practices are found to be viable but may not be in the long run, because of the volatile market in Metro Manila,

distance between the market and producers and the high cost of handling and transport services (Antolin *et al.*, 2005).

A study of the Post-harvest Horticulture Training and Research Center at the University of the Philippines-Los Baños simulated handling trials for refrigerated and non-refrigerated transport of bell pepper, broccoli, lettuce, sweet peas, Chinese peas, young corn and Baguio beans. Results of interviews with supermarket packers stated that post-harvest interventions for the said crops extended the shelf life and reduced losses. Economic analysis of transport by refrigerated trucks showed a higher rate of return and a lower payback period than the unrefrigerated transport (Yaptengco *et al.*, 2003).

#### **Inflow and outflow of semi-temperate vegetables**

A study conducted by the Cordillera Highlands Agriculture and Resources Management Project (CHARM) showed that major highland vegetables brought in to Baguio City and La Trinidad (major market destinations) were cabbage, potatoes, Chinese cabbage, carrots and chayote. Other major market destinations include Metro Manila and the nearby provinces of Pangasinan, Pampanga, Nueva Ecija and as far as the Bicol region. In this study, it was observed that high inflow volume results in low price. Likewise, average wholesale prices of perishable vegetable commodities fluctuated sharply while nonperishable vegetables like potatoes had relatively stable prices (Bektas, 2003).

In another report, Mindanao producers of semi-temperate vegetables were beset with the following marketing related problems namely: erratic supply and quality of produce; poor farm-to-market roads; inadequate storage facilities; limited access to reliable market information; lack of entrepreneurial skills among growers and cooperatives; and lack of promotion for increased vegetable consumption (Infante, 2004).

#### **Post-harvest handling system assessment**

A study conducted by the Benguet State University in 2004 assesses the actual post-harvest losses of selected vegetables at various handling points at the La Trinidad Trading Post. This study showed the specific causes of losses at various handling stages, as shown in Table 1 below.

A report of the status of the vegetable industry in Mindanao, the Philippines' second largest island and a major producer of semi-temperate vegetables, underscored the challenges in post-harvest treatment of semi-temperate vegetables, which include the following: lack of quality standards, poor handling, packaging and transport practices; lack of proper facilities for transport and storage; and high cost and non-availability of post-harvest supplies and equipment (Infante, 2004).

**Table 1: Reasons for post-harvest losses at various handling points in the vegetable supply chain of La Trinidad, the Philippines**

Harvesting	Incorrect timing, under- or overdeveloped produce, rough harvesting (harvesting not done carefully; harvesting containers not appropriate), exposure to unnecessary high temperature (harvesting during warmest time of the day; produce standing under the sun); rough field transport (careless driving, unsuitable vehicles, too high loading)
Grading or packing	Lack of quality standards or minimum requirements, rough handling, unsuitable containers (too large, not rigged, not smooth, not stackable); overfilling of containers
Assembling	Assembly points not adequately prepared and equipped
Loading and unloading	Rough handling, loading too high, bad stacking; for storing: inadequate ventilation of storage rooms, heaps for stacks, storage temperatures too high, rough handling, too high heaps or stacks
Transport	Rough roads, careless driving, unsuitable vehicles
Wholesaling	Insufficient protection against the sun and rain, rough handling, insufficient space, irresponsible labourers
Retailing	Insufficient protection and space at the retail markets; replenishment at too long intervals in retail shops, insufficient protection

Source: Salda *et al.*, 2004

### **Status of technology transfer initiative**

#### **Cold Chain System**

The programme aims to establish pilot cold chain systems integrated in the marketing operations of small vegetable farmers. Its objectives are to identify traditional and alternative routes of high value crops and determine the technical, economic and marketing requirements. It is also aimed to provide assistance among high-value crops (HVC) growers and traders in the acquisition of cold chain infrastructure and facilities in selected pilot sites. It also provides information support, training and extension to promote the cold chain technology for the vegetable industry (Paz, 2004).

#### **Pilot trade routes for vegetables in the Philippines**

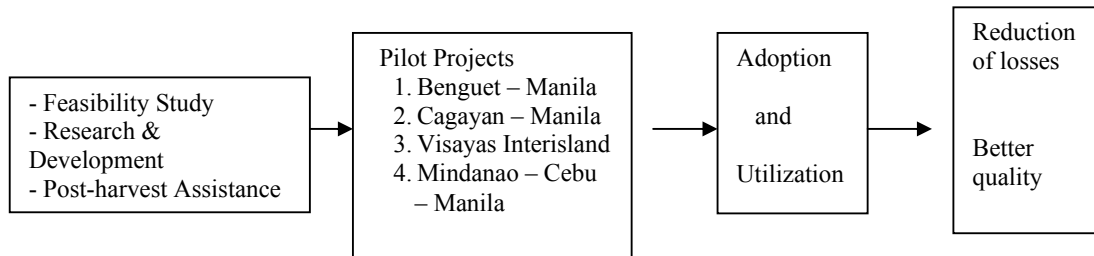
Benguet – Manila line  
 Cagayan – Manila line  
 Visayas – Interisland connection  
 Mindanao – Cebu – Manila line

Cold chain facilities have already been installed in the Benguet – Manila, Cebu – Manila and Mindanao – Manila lines. These cold chain facilities are being managed by private organizations who are groups of farmer producers.

### National Cold Chain Programme

An interagency task force was organized to undertake the national cold chain programme composed of the Department of Agriculture's Agricultural Marketing Assistance Service, High Value Crops Programme, Post-harvest Horticulture Training and Research Center, National Agricultural and Fishery Council and the stakeholders from the private sector. The programme components include research and development, pilot projects, training and extension, information dissemination, and policy advocacy, as shown in Figure 1 below.

**Figure 1: National Cold Chain Programme Framework**



A forum was conducted on 30 October 2003, attended by different stakeholders of the cold chain industry. A training course was conducted in December 2003 to educate farmer producers on the benefits of the project.

The Benguet Cold Chain Project was inaugurated on 23 July 2004. Facilities like cold storage and refrigerated trucks were turned over to beneficiaries. Similarly, the Visayas Interisland Cold Chain Project was launched in Cebu and the Mindanao Cold Chain Project followed suit in April 2003 (Mallo, 2005).

### Conclusion

The paper has documented the current efforts in terms of research, development and technology transfer in improving the quality after harvest of semi-temperate vegetables in the Philippines. Salient findings include the viability of establishing a cold chain system as a viable alternative in the transport and post-harvest handling of semi-temperate vegetables.

Better quality and premium prices would accrue to farmer producers as higher income, relatively steady supply and fair prices, if better technologies are introduced like the cold chain facilities.

Research and development results need to be disseminated to industry stakeholders so as to create awareness and stir interest for technology adoption. Also, these research findings need to be popularized through the use of instructional, educational and communication materials to form part of the continuing efforts of technology transfer to industry stakeholders.

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## **Post-harvest fruit sorting by optical graders: tests of efficiency on citrus fruits and table tomatoes**

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### **Abstract**

*The cultivation of tomatoes and citrus is widespread in Southern Italy. For tomatoes, favourable weather conditions in Southern Italy make it possible to obtain multiple harvests which are highly appreciated by both the national and the international market. In order to satisfy consumers and remunerate the growers for the higher costs they must bear to extend the season, customers must be presented with a product that meets the market's requirements. Post-harvest processes provide a useful tool to pursue this objective. The present study focuses on the assessment of the efficiency of two optical graders with special focus on the levels of accuracy attained by the devices in question. Tests on the accuracy of grading were performed using manually precalibrated fruits (oranges, lemons and tomatoes) which had already been assigned a number to allow for their traceability during various repeats at different speeds. By processing the data obtained from the different tests, the optical graders under study fared very well in terms of accuracy, even at higher test speeds, thus guaranteeing elevated throughputs. The best results were registered with a grader that performed grading operations for 80 percent of the fruit with an absolute error of 2 mm, which proved to be below or equal to 1 mm for most of the calibration operations.*

### **Introduction**

The fruit and vegetable sector has always been of paramount importance to the Italian economy both in terms of production (around 53 million tonnes) and in terms of its impact on trade flows and business operations both upstream and downstream. Among the fruit destined for fresh consumption, citrus plays a crucial role. In 2004, some 3.3 million tonnes of citrus fruit were produced (ISTAT, 2006). The cultivation of citrus is particularly widespread in Southern Italy, where orange and lemon trees outnumber other citrus fruit.

The cultivation of tomatoes is particularly widespread in Southern Italy where favourable weather conditions allow for multiple harvests. Favourable climatic conditions result in high quality produce which is appreciated both in Italy and abroad. However, keeping consumers satisfied and producers fairly remunerated calls for producing fruits which respond to the requirements of the market. For this reason, post-harvest operations (sorting, gauging, control, grading, packing) have received as much attention as the cropping operations.

The manufacturers of the machines for post-harvest operations rely on different lines of technology. Mechanical grading systems based on fruit size or weight parameters were particularly widespread in the past. These mechanical systems essentially rely on slotted vibrating tables, on slotted rotating drums, or on properly sized screw sorters, which cause the fruit to fall out at specific drop locations according to their size. These systems are today losing ground to electronic graders which essentially rely on vision technology, whereby images are taken by one or more video cameras and analysed by a digital image processor, detecting those geometric parameters which make it possible to grade fruit (Guidetti and Oberti, 1999).

In addition to minimizing fruit damage, these optical graders are characterized by a high level of accuracy and the possibility of varying their sorting schemes. Today, different models of optical graders are available on the market, which are able to meet the different needs of highly diversified Italian packhouses. Therefore, it was decided to carry out an analysis of the operation of two optical graders in two modern packhouses. The results of some preliminary tests carried out on oranges, lemons and tomatoes are given as a part of a much broader research effort to be carried out on other types of fruit as a supplement to the present study.

### **Materials and methods**

The two plants in question make use of conceptually similar systems for fruit and vegetable sorting operations (optical graders). However, the two systems are operated by different producers and are intended to meet different needs in terms of work capacity.

#### **Plant A**

The main element of the plant in question is a Maxsorter V2000 optical grader produced by Maxfruit. During the test period, the grader was still in one of the factories of the producer (Alzira, Valencia), before being delivered to the customer.

The grader was fed by manually overturning the fruit baskets (no mechanical feeder had been mounted) onto a roller conveyor which distributed the fruit in one layer. This part of the operation is used to control and discard fruit with defects manually.

This is followed by four devices used to singularize fruit onto four conveyors made up of a succession of double truncated-cone rollers with a pitch of about 0.1 m. Thanks to this mechanism each fruit finds its place between two successive rollers.

The roller conveyors then advance individual fruit and cause them to pass through a vision chamber where a video camera acquires images of the fruit in transit on two adjacent lanes. When the fruits enter the vision chamber, the double cones supporting the fruit start to rotate, thus causing the fruit to rotate, making their surface entirely visible. Four images are acquired for each fruit which are forwarded to a processor equipped with an analogical–digital converter for data to be entered into a calculator.

Once the gauge of the fruit in question has been defined, the calculator assigns the fruit to a given exit according to the grading programme established by the operator. An

impulse (ejector) at the exit in question causes the fruit to be conveyed into the processing beds where skilled workers perform the packing operation. The number of exits can vary as a function of needs and of the space available. In the plant under study, there were four exits in addition to another one destined for waste and for fruit that had escaped grading. The need for labour ranged from 13 to 16 workers for grader A, depending on the work.

The computer screen of the grader displays the data obtained: maximum chord of the normal section of the fruit polar axis (referred to as maximum equatorial diameter), the length of the polar axis and volume.

### **Plant B**

In this plant, post-harvest processing is based on two sorting lines which use two optical graders, the Unical 600T-OC, produced by Unitec of Lugo-Ravenna. The two sorting lines are in operation in one of the Oranfrizer plants located at Scordia (Catania). Oranfrizer is a leading company in the production, processing and commercialization of citrus fruit and of other fruit and vegetables.

Each line is fed by mechanically overturning the fruit boxes onto a roller conveyor. A hand-made selection takes place in this area. Fruit is then advanced from this area to a slotted drum pregrader that discards “undersized” fruits.

Fruit is then washed in a basin to be cleaned by brushes and dried in a chamber with hot air. Should it be needed, fruit is then waxed before being conveyed to an area where additional manual sorting is carried out to discard rotten produce and fruit with evident imperfections. The rotary motion of the conveyors facilitates inspection and manual sorting.

In order to feed the graders, the fruit is first aligned. Each lane has its own aligner (six per machine). The two graders utilize a system for advancing fruit into the vision chamber (similar to that already described for plant A), as well as a video camera that acquires images of the fruit in transit on two adjacent lanes. The machines are also equipped with a series of labellers (produced by Sinclair) that make it possible to label each individual piece of fruit.

The system that conveys fruit towards the machine exits is particularly sensitive. The ejection system, which relies on an ejector, pushes the fruit towards a brushing roller placed at the exit. The roller takes fruit within its soft synthetic bristles and, by rotating it, gently discharges the fruit onto the conveyor underneath without damage. Such a system is also present on the grader of Plant A.

Each grader in Plant B has 29 exits for sized fruits and one exit for non sized fruit. The number of workers for each of the two lines may vary from 20 to 30 according to the throughput. In this plant, both machines and processing operations are monitored by a computer. Unitec is able to check both the operation and calibration of its machines through the Internet thus reducing most customers' interventions.

### Test methodologies

The determination of the work capacities of the two machines was made by verifying the filling percentage of the sectors destined to held fruits on the roller conveyors by applying the following formula:

$$C = V \times 3600 \times R \times n$$

where C = work capacity

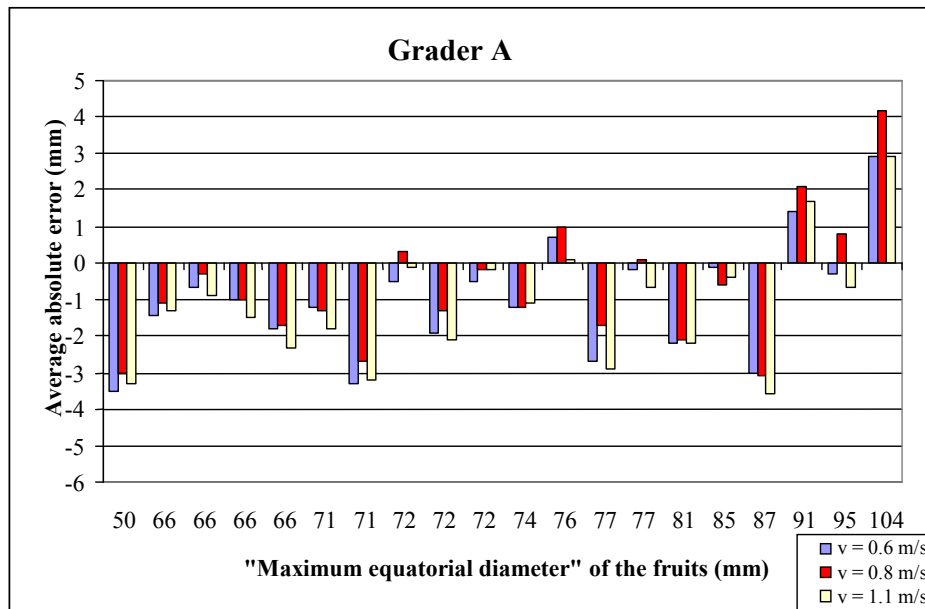
V = velocity expressed in sectors per second

R = filling percentage of sectors

n = number of channels (Ragni, 1996).

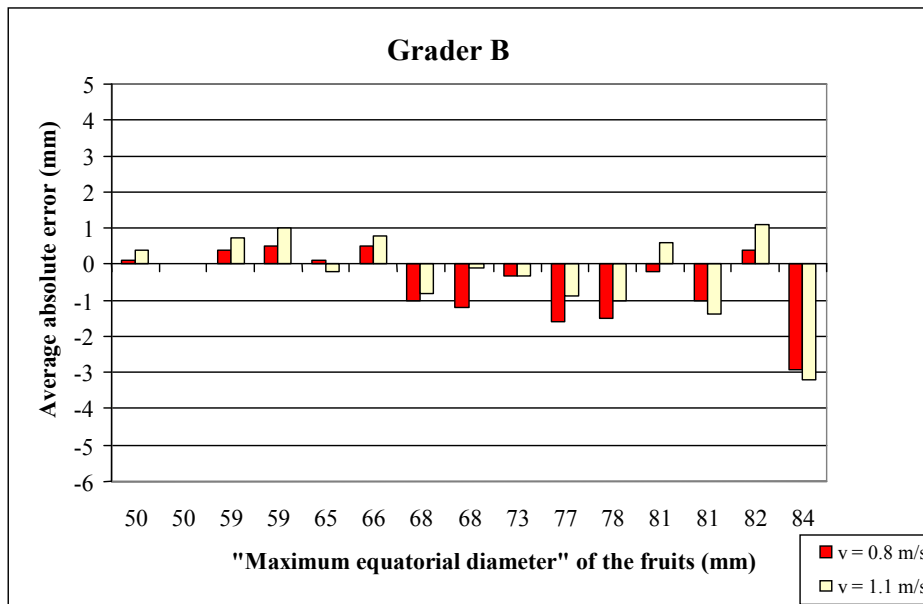
Tests were then performed with a view to determining the accuracy of the calibration. Twenty sample oranges were selected for Plant A which were characterized by differing sizes and shapes with the objective of assessing the operation of the graders in the different cases under study (Figure 1).

**Figure 1: Machine A - Absolute error (average of 10 repeats) registered for sample fruits (oranges)**



Similarly for Plant B fifteen lemons and fifteen tomatoes with different gauges and shapes were used as samples (Figure 2).

**Figure 2: Machine B - Absolute error (average of 10 repeats) registered for sample fruits (lemons)**



Some fruits had the same size but a different polar axis. A sample of each one of the different typologies of the fruit usually processed was obtained for the species in question. These fruits were all numbered and the maximum chord of the normal section of their polar axis was measured as required under EU Regulation EC2001 for calibration of most fruit and vegetables. This parameter is usually referred to as “maximum equatorial diameter” in spite of the fact that the fruit cross-section, which exhibits a longer diameter compared to the other regions, is seldom found in the median area. Fruit was then placed, one by one, on the conveyor belts of machine A and machine B to be advanced to the vision chamber. Ten repeats were made for each fruit.

Tests were repeated at three conveyor belt speeds for Grader A: 0.6 m/s; 0.8 m/s and 1.1 m/s (corresponding to 6 sectors/s, 8 sectors/s, and 11 sectors/s), and at two conveyor belt speeds for Grader B: 0.8 m/s and 1.1 m/s (8 sectors/s and 11 sectors/s).

The values of the diameter measured by the graders were stored in a PC during each passing of each fruit into the vision chamber. The data provided by the graders were compared to those obtained by manual calibration. The results were analysed taking into account the absolute error, i.e. the difference between the equatorial diameter of the fruit as assessed by the grader and that provided by the manual gauge. Both values and sign of the absolute error were assessed in one analysis to highlight the occurrence of any systematic errors.

For some graphic representations it was necessary to resort to the mean value of the absolute error calculated on the ten test repeats performed on each fruit. Even so the standard deviation value was also assessed, together with the index of data dispersion around their average and the coefficient of variability. What is more, in order to test the level of association between absolute error and fruit size, simple linear correlation was

used. The significance of the correlation coefficient ( $r$ ) was assessed up to a probability level of 1 percent (Camussi *et al.*, 1995).

EU legislation for both citrus and tomatoes (EC Reg. N° 1799/2001, EC Reg. N° 790/2000) specifies that for all categories and for each form of presentation, only 10 percent of either total weight or the number of fruits having a size immediately larger than or smaller than that indicated on the label, are allowed. Therefore it was decided to take into account the absolute error in absolute value ( $|Ae|$ ) of the measurements made on the fruit by the two graders compared to the actual size of fruit. In order to improve further the accuracy of the measurements performed by the graders, three error intervals were indicated ( $0 \leq |Ae| < 2$ ;  $2 \leq |Ae| < 5$ ;  $5 \leq |Ae| \leq 7$ ) with the percentages of the cases of errors found to fall within said intervals at different speeds.

### Results

The experiment carried out was not meant to compare the two graders produced by the two different companies. Quite the contrary, it was intended to supply data concerning the efficiency of fruit graders under real operating conditions.

The filling percentage in the conveyor sectors destined to fruit on both graders was found to be close to 70 percent and to remain constant at the different speeds. The work capacity of the machines was assessed and observed to be very high especially at maximum speed (Table 1).

**Table 1: Work capacity of the graders under study**

Gaugers	Lanes (no.)	Processed fruits	Speed (m/s)	Work capacity (fruits/h)	Work capacity (t/h)
A	4	Oranges	0.8	80 640	6.77
			1.1	110 880	9.31
B*	6	Lemons	0.8	120 960	9.67
			1.1	166 320	13.30
B*	4	Tomatoes	0.8	122 688	9.69
			1.1	168 696	13.32

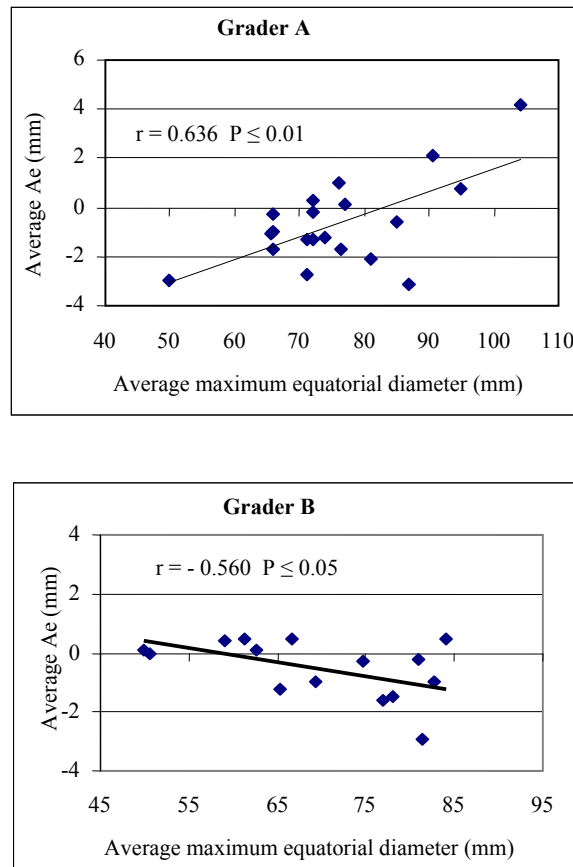
\* Data of one of the two graders of plant B

The increase in the work capacity of optical graders can be obtained by either increasing the number of processing lanes or by increasing the speed of conveyors. Thanks to the great advances in the field of sensors and the great progress made in terms of data acquisition and calculation of the processes used to assess the size of fruit, it is possible for machines with conveyors to operate at a speed of 1.1 m/s and more, with no negative effect on calibration operations and a remarkable increase in work capacity.

The results of the tests performed (Figures 1 and 2) confirm that the absolute error does not increase with increasing speed. Quite to the contrary, at a conveyor speed of 1.1 m/s the error was lower than that achieved at a conveyor speed of 0.6 m/s. For Grader A,

Figure 1 highlights a sizable underestimate error at least for smaller fruits. By applying the simple linear correlation method (Figure 3), it is possible to observe that the degree of association between absolute error and fruit size is highly significant.

**Figure 3: Graders A and B. Correlation between fruit gauge and the absolute error (Ae) of the machine measurement (Grader A – oranges; Grader B – tomatoes)**



In fact a correlation coefficient ( $r$ ) of 0.636 was registered. A simple linear correlation with 18 degrees of freedom results in a probability level ( $P$ ) of 1 percent thus indicating a highly significant correlation (Camussi *et al.*, 1995).

In this respect it is worthwhile mentioning that the regularity in the shape of the oranges under study diminished as the gauge of the fruit in question increased. During the tests, the larger fruit were observed not to rotate during their transit through the vision chamber thus making it impossible to assess exactly their maximum equatorial diameter as the four pictures acquired from the video camera all focused on the same portion of fruit surface.

For Grader B, with both lemons and tomatoes, a lower average absolute error was observed which was close to 0 mm for some sample fruits, and around  $\pm 1$  mm in most

cases. These results are of paramount importance especially in view of the fact that the irregularity of the surface exocarp of lemons makes it more difficult for optical vision systems to assess the exact gauge of these fruit and that of so-called “ribbed” tomatoes. Even so, for Grader B, the absolute error tended to increase with larger fruits. In fact the correlation turned out to be significant ( $r = -0.560$ ), which, for 13 degrees of freedom, was tested up to a probability level of 5 percent (Camussi *et al.*, 1995).

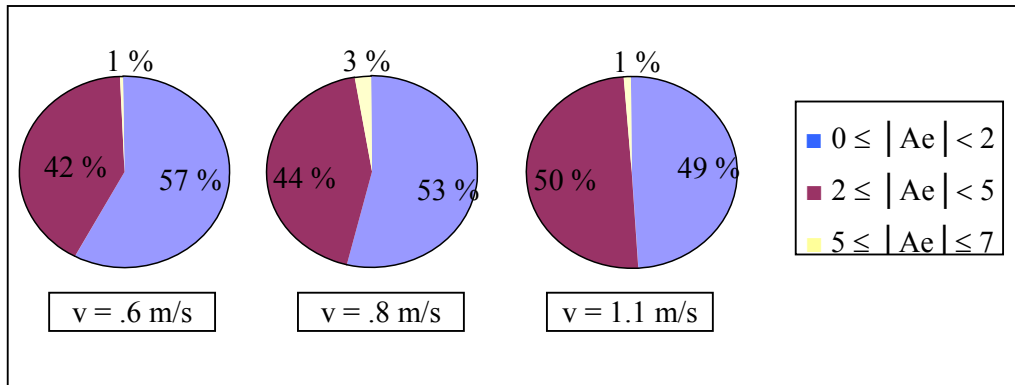
Moreover test repeats highlighted a good level of homogeneity across the different “readings” of the diameter on the same samples in different passings before the video camera. The standard deviation calculations, which were carried out to analyze the variability of the data obtained for each fruit compared to the mean of the ten repeats, was always lower than  $\pm 2.5$  mm for Grader A and even lower than  $\pm 1.7$  mm for Grader B (Table 2).

**Table 2: Average standard deviation (SD) and variation coefficient (VC) for Graders A and B**

Speed (m/s)	Grader A		Grader B		Grader B	
	SD	VC	SD	VC	SD	VC
0.6	0.86	1.14	Lemons		Tomatoes	
0.8	0.96	1.25	0.86	1.22	0.82	1.21
1.1	1.21	1.60	0.76	1.09	0.80	1.23

Optical grader producers usually declare a grading error within 1 mm. Grader A, which was used to grade oranges, registered a maximum error, in terms of absolute value, of 7 mm (Figure 4).

**Figure 4: Grader A – oranges. Percent of cases observed on three intervals of absolute error in terms of absolute value (mm) |Ae|**

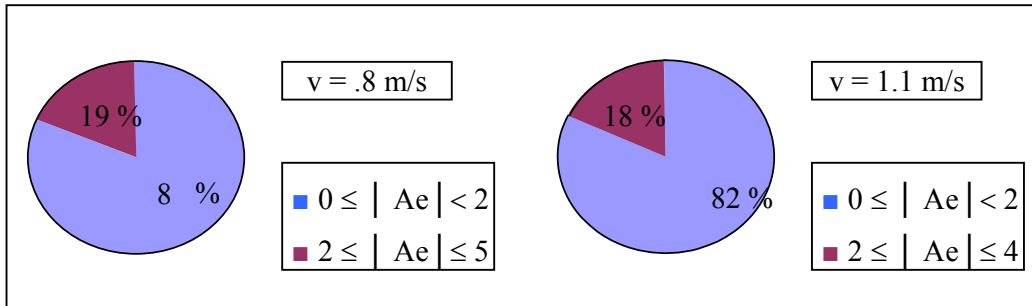


Considering an interval of absolute error in the 5–7 mm range, 1 percent of the measurements carried out at speeds of 0.6 and 1.1 m/s were affected by such an error. At a speed of 0.8 m/s, the number of measurements affected by the error did not exceed 3 percent.



The results obtained from Grader B highlighted a more elevated accuracy as the maximum absolute error was of 5 mm at a speed of 0.8 m/s and only 4 mm at a speed of 1.1 m/s (Figure 5).

**Figure 5: Grader B – lemons and tomatoes. Percent of cases observed on three intervals of absolute error in terms of absolute value (mm)**



What is more, over 80 percent of fruits were read and graded with an absolute error in terms of absolute value lower than 2 mm, which turned out to be lower or equal to 1 mm in most cases. The errors recorded were higher than those generally declared by producers. However, this last phase of data processing highlighted that grading was made with a certain level of accuracy at all test speeds, more so by Grader B.

In both cases the data obtained confirms satisfactory levels of accuracy, especially in view of the fact that it was deliberately decided to perform difficult tests with the machines by choosing sample fruit of different sizes and shapes and selecting speeds higher than those usually used during processing operations and advised by the manufacturers. In addition, the fruit was handled very carefully at both lower and higher speeds.

As the tests were performed on different fruits, the operation of the two grading machines cannot be directly compared. While these grading machines are primarily used for citrus, in Plant B, the two grading machines were used to process different species of citrus fruit from October to June, and for the rest of the year, they were used to sort peaches, nectarines, pears and tomatoes. This implied a very intensive use of the grading machines and therefore a lower unit cost of sorting operations at the packhouse. The initial investment needed to purchase modern post-harvest graders may deter small farms from equipping themselves with these machines. Instead, the remarkable benefits in terms of quality of the sorted produce, labour saving, the possibility of varying the sorting processes to meet the different needs of consumers, as well as the possibility of using different sorting schemes for different fruits in order to respond to varying needs in terms of machine operation capacity should be taken into account.

## Conclusions

The analysis of the operation of the optical graders under study has highlighted that, even at elevated speeds and throughputs, these machines provide greater accuracy in sorting citrus fruit by size. What is more, this accuracy has positive implications on the packaging processes as packhouse workers are only asked to transfer fruit into relevant

packages, thus avoiding the time and energy consuming control of the final processing phases required in traditional grading systems to eliminate possible errors. Such a benefit, together with the possibility of processing different types of fruit and therefore to increase the annual utilization of graders, results in important savings in terms of post-harvest processing costs.

In addition, the machines in question are characterized by the possibility of varying the sorting schemes by user-friendly adjustments of the control system. They also handle produce very kindly thus minimizing damage to the fruit.

Most modern optical grader manufacturers are able to supply models that meet the different needs (in terms of machine operation capacity and overall dimension) of fruit and vegetable post-harvest processing businesses. One–two lane graders are available, which are used either for produce sampling or in small businesses, but graders with 8–10 lanes are produced for larger businesses. Sometimes, in order to obtain greater packhouse flexibility, graders operating in parallel are preferred to machines with an elevated number of lanes (as was the case for plant B).

In the last few years, Italian fruit and vegetables have started to loose ground because of fierce competition from other countries (Spain, France, Belgium, and the Netherlands). Recovering competitiveness is only possible through strict compliance with regulations in terms of quality, as well as through standardization and excellent presentation of a wide range of products. The use of graders such as the ones under study can undoubtedly contribute to the above objectives through optimization of post-harvest operations.

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## **Deliberate contamination of modern food supply chains and the value of quality assurance systems**

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### **Abstract**

*Modern food supply chains have become increasingly globalized and complex and have become the domain of the private sector with governments mainly providing a regulatory and hygienic oversight. Increasing globalization of food trade, however, also means a reduced ability to respond to food emergencies for several reasons including the emergence of private sector governance of food safety, the need to engage key government agencies in the countries of production, shipment and consumption and the requirement to inform consumers of possible problems. The modern food supply chain, by its size and scale, is also susceptible to deliberate contamination activities or food bioterrorism, and there are many reported cases involving the use of pathogenic agents to infect livestock or contaminate food. With the increased political unrest in many areas of the world today, targeting food supply chains provides the opportunity to cause maximum fear and disruption to consumers and food businesses in regions far away from the point of contamination, be it during production, processing, distribution or sale. Many of the private standards operating internationally today require organizations to test their systems of process management and product recall individually. The approach to this, however, is generally associated with food safety risks linked to accidental contamination (or “errorism”). What is unclear though is to what extent such systems could cope with deliberate contamination (or terrorism) and how they would link to regulatory controls and emergency response mechanisms. Combating deliberate contamination of our food supply chains will require a coordinated response from government agencies and those involved in food supply. This paper explores examples of deliberate contamination and clearly identifies the need for industry cooperation with regulatory bodies. The paper discusses ways in which the main private supply standards operating internationally could support regulatory efforts to combat food bioterrorism.*

### **Deliberate contamination of the food supply chain**

The World Health Organization has defined food terrorism as “an act or threat of deliberate contamination of food for human consumption with chemical, biological or radionuclear agents for the purpose of causing death to civilian populations or disrupting social, economic or political stability” (WHO, 2002).

Food contamination whether accidental or deliberate can have far reaching impacts on individuals and organizations, and can detrimentally impact on those food supply chains targeted. This paper builds on a review of deliberate contamination carried out by

Manning *et al.* (2005) and focuses on the use of agents such as foreign animal disease and other physical, chemical or biological contaminants of food. The paper reviews specific cases of contamination in order to determine the mechanisms currently in place to counteract contamination whether accidental or, as defined by Nestle (2003), as “the deliberate poisoning or contamination of the food supply to achieve some political goal”.

Governments have a role in facilitating preventative food safety through both voluntary and regulatory mechanisms (WHO, 1996). However, increasing globalization of food trade means that national regulatory bodies may be unable to respond strategically to a food emergency unless they have established interagency strategies across national borders. Furthermore, the lack of such interagency cooperation could have significant consequences on health and trade in many countries (WHO, 2002).

From an industry perspective, it is the accepted practice along modern food supply chains that individual organizations should implement and routinely test management responses to food non-conformities along with the ability to initiate product recall systems. Indeed this is often a prerequisite for suppliers operating under all of the post farmgate standards operating internationally (e.g. SQF2000, BRC, IFS and the new ISO22000); it is not, however, a requirement for most prefarmgate standards.

The impact of deliberate food contamination was demonstrated by Manning *et al.* (2005) in their review of the personal and economic impacts of documented food safety incidents (Table 1).

**Table 1: Personal and economic impact of food safety incidents  
(- indicates no data available)**

Year	Place	Food	Agent	Cost	Human Impact	Ref
1981	Spain	Cooking Oil	Chemical	-	20 000 injured 800 fatal	(WHO, 1983)
1985	USA	Watermelon	Aldicarb	-	1 373 cases	(Green <i>et al.</i> , 1987)
1985	USA	Milk	<i>S. typhimurium</i>	-	170 000 cases	(Ryan <i>et al.</i> , 1987)
1989	Chile	Grapes	Alleged contamination with Cyanide	c. US\$100 million	-	(Root- Bernstein, 1991)
c. 1999	UK	Beef	Prions	c. US\$ 7 billion.	120 deaths of nvCJD by 2001	(Nestle, 2003)
1991	China	Clams	Hepatitis A	-	300 000 cases	(Halliday <i>et al.</i> , 1991)
1994	USA	Liquid ice cream	<i>S. enteritidis</i>	-	224 000 cases in 41 states	(Hennessy <i>et al.</i> , 1996)
1996	USA	Apple Juice	<i>E. coli</i> 0157:H7	c. US\$14 million	70 hospitalized 1 fatal	(Nestle, 2003)
1996	USA	Guatemalan Raspberries	<i>Cyclospora cayentanensis</i>	-	1 465 cases	(Herwaldt <i>et al.</i> , 1997)
1998	USA	Frankfurters/ luncheon meat	<i>Listeria</i>	US\$ 50 – 70 million	35 cases	(Carus, 1999; FSIS, 2004)

Source: Manning *et al.* (2005)

There are a number of reported examples of deliberate food contamination (Manning *et al.*, 2005; Table 2).

**Table 2: Reported incidents of deliberate food contamination  
(- indicates no data available)**

Year	Country	Farm or Food	Agent	Economic Cost	Human Impact
1952 (Wilson <i>et al.</i> , 2000)	Kenya	Cattle	Plant toxin (African milk bush plant)	-	-
1978–1980 (Wilson <i>et al.</i> , 2000)	ex-Rhodesia (Zimbabwe)	Cattle	Anthrax	-	-
1984 (WHO 2002; Chalk, 2003; Nestle, 2003)	USA	Contamination in salad bars	<i>S. typhimurium</i>	9 out of 10 restaurants closed	751 cases
1985 (Green <i>et al.</i> , 1987)	USA	Watermelon	Aldicarb	-	1 373 cases
1987 (WHO, 2002)	Israel	Citrus fruit	Mercury	-	-
1997 (Nestle, 2003)	USA	Doughnuts	Shigella	-	45 cases

Source: Manning *et al.* (2005)

The following examples are indicative of the motivations to cause contamination along with the human and economic consequences of such acts:

- During their uprising in Kenya 1952, the Mau Mau used African Bush Milk (a plant toxin) to poison steers of the Kikuyu tribe to cause political unrest.
- In 1974 a Palestinian group calling itself the “Revolutionary Command” claimed to have contaminated grapefruit exported from Israel to Italy. Four years later another Palestinian group, the “Arab Revolutionary Council”, targeted Israeli citrus fruit using liquid mercury as an agent. Ten years later Israeli grapefruit exports were again threatened with contamination. In all these incidents, the primary goal appeared to be economic disruption (Cameron *et al.*, 2001).
- In 1981 an ecoterrorist group called “Dark Harvest”, threatened to place anthrax-contaminated soil in places throughout the United Kingdom to highlight the ecological dangers of chemical and germ warfare.
- In 1986 Tamil militants threatened to destroy Sri Lanka’s national economy either by using potassium cyanide or by bringing in non-indigenous diseases to devastate rubber and tea plantations. Tea is Sri Lanka’s main source of revenue.

### Current operational risk management strategies

It is not possible to guarantee food safety as all foods, and the processes they are subject to involve elements of risk. Therefore, it is essential that the food industry and regulators ensure that effective risk management strategies are in place. The European Commission defines risk as “a function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard(s) in food” (EC, 1997). Risk analysis can be further broken down into three components, risk assessment, risk management and risk communication.

The Codex Alimentarius Commission (CAC) has adopted international definitions of risk relating to food safety (CAC, 2003). **Risk assessment** is the science of understanding hazards, the likelihood of their occurrence, and, the consequences if they do occur. On the other hand **risk management** is the mechanism of analysing policy (or

management) alternatives following risk assessment and identifying and implementing appropriate controls including regulation (and operational controls). The European Commission further defined **risk communication** as “the interactive exchange of information and opinions concerning risk among risk assessors, risk managers, consumers and other interested parties” (EC, 1997).

Manning and Baines (2004b) noted that risk management differs from inspection-based controls in that it is primarily science-based and developed from a set of food safety objectives. Such operational risk management plans may be implemented at the company, national or regional levels and generally focus on accidental contamination from physical, chemical or biological sources.

### **Deliberate food contamination**

Deliberate contamination has generally been focused at national or regional levels as a political tool. This is aptly demonstrated in the United States of America under the Public Health, Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act) where Part Three addresses protecting safety and security of food and drug supply. In contrast, deliberate contamination at the company level is generally associated with the actions of individuals who may have an “issue” with that company; this is often considered to be sabotage as opposed to terrorism.

In order to make the links between terrorism and sabotage, and the strategies to combat them, this paper argues that operational risk management should also address deliberate food contamination right down to the company and discrete food chain level. This would then place the potential threat of bioterrorism and the agents that could be used in the context of the more usual portfolio of risks to food safety considered at the business level.

The USDA (2001) has argued that food safety management programmes need to address the prevention, detection and control of food sabotage. The first step is to identify **potential perpetrators** of deliberate food contamination including personnel who:

- Work for the organization who wish to contaminate the food source;
- Wish to gain access to the food source within a facility either by deception, by forced entry or other means and;
- Intend to make exterior attacks from outside the facility.

The second step is to identify **potential agents** that could be used in an incident of bioterrorism. These need to be considered as part of the risk management approach. Agents capable of causing localized or widespread incidents include:

- Biological agents (communicably infectious or non-infectious pathogenic microorganisms, including bacteria, microbiological toxins, algae, viruses, fungi, parasites, protozoa, insect pest and worms), which could be delivered in the form of liquids, aerosols, or solids;

- Chemical agents (i.e. synthetic and natural toxins including pesticides, rodenticides, heavy metals, cleaning chemicals, toxic chemicals), which could be delivered in the form of airborne droplets, liquids, aerosols, or solids;
- Physical agents (including bone slivers, glass fragments, ceramic, metal, wood, plastic), which could cause contamination at any stage in the supply chain;
- Radiological agents (radioactive elements capable of causing harm) that can be delivered in liquid or solid form;
- Prions;
- Allergens including cereals containing gluten, crustaceans, eggs, milk and associated products, celery, mustard, sesame seeds, fish, soybeans, and nuts.

The third step is to identify and develop possible **methods of detection** of these agents through detection equipment (physical and radiological contamination), chemical analysis (chemical contamination) and microbiological analysis (biological contamination).

### **Public response mechanisms**

In the event of a contamination incident, public risk controls should be implemented (Huxsoll, 2000; Royal Society, 2002). However, the effectiveness of these controls depends on the “preparedness plans” that have been developed, tested and implemented and on the assessment of vulnerability of the country or supply chain (WHO, 2002).

The main elements of such public risk controls and plans include:

- Preventative measures such as Hazard Analysis Critical Control Point (HACCP) management plans including the mechanisms for detection and identification of agents;
- Quantitative modelling to develop strategies in the event of food contamination, especially an outbreak of plant or animal disease. This requires the development of databases to aid the modelling process;
- Prompt identification of agents by a coordinated network of suitably resourced laboratories. This is key to an effective response mechanism;
- Health professionals being aware of the symptoms in humans caused by potential agents and reporting mechanisms to identify trends promptly;
- Introducing methods of diagnosis of disease;
- Effective vaccines, chemoprophylactics and therapeutics being readily available;
- The development of biosecurity measures including decontamination and disinfection;
- Effective communication of information both before and during an incident to minimize the potential for chaos and panic;
- Control of pests which might spread the agent of food contamination;
- Disposal of plant materials, carcasses, food products and possibly human corpses;
- Securing the food and water supply chain.

The preventative measures above already include some fundamentals of industry-based risk management hence supporting our argument to link public and private strategies.



We would argue that public controls should also include training programmes at all stages of food supply chains and in public agencies so individuals understand the requirements of both routine and emergency biosecurity protocols and the mechanisms used by each party as well as recognizing the degree of vulnerability of supply chains under review.

Vulnerability should be assessed on the basis of “the scientific, economic, political and social circumstances of a country (supply chain or business) to measure the extent of the threat and to set priorities for resources” (WHO, 2002) and be assessed “as a multidisciplinary activity, with input from legal, intelligence, medical, scientific, economic and political sectors”. From a national or international perspective, the WHO considers that vulnerability may be assessed on the basis of:

- The effectiveness of the countries’ food safety management infrastructure and current surveillance mechanisms;
- Availability of potential food contamination agents;
- Motivation for perpetrators of food terrorism;
- Potential for the agent to contaminate mass-produced food and gain widespread distribution;
- Potential of human-to-human transmission of the agent;
- Capability for an effective emergency response and;
- Potential size of the threat to the food supply chain, animal health and welfare, export food trade, tourism and public health.

We would argue that the food industry should be included as part of the vulnerability assessment, especially those who know the logistics and quality assurance mechanisms of food supply, as they can make the links between existing industry risk management strategies and those of public agencies.

### **Food industry response mechanisms**

Given this framework for public response to contamination incidents, several key elements focus on the food industry. Most importantly there is the adoption of HACCP as the preferred risk tool linked to appropriate management systems. However, there is the need to also include “unknown risks” as part of this assessment. This is where close links are needed between industry and those involved in vulnerability assessments.

The main drivers for the adoption of HACCP are government regulations (for high-risk foods) and market driven private standards. In terms of food globalization it could be argued that the main international private standards have the greatest impact on safety management. This leads us to consider, which ones of these standards are based on HACCP adoption? How are these standards linked along discrete supply chains? Do they attempt to address “unknown risks” and bioterrorism challenges?

As Table 3 below demonstrates, all international standards operating beyond the farmgate use HACCP as the risk identification, management and communication tool; however, only the SQF 2000 code is developing any form of specific standard to address food security and bioterrorism.

**Table 3: Food safety risk assessment and management of the main international food and farm standards**

Standard	Risk Assessment	Product Trace	Product Recall	Links to other Standards	Comment
GLOBALGAP Primary production	Pre-requisite GAP protocols	Yes	No	None	Does not require individual farm risk assessment of food safety. Would require HACCP further along chain. Not sensitive to bioterrorism issues.
BRC Food industry	HACCP	Yes	Yes	None	Risk assessment within individual business, capable of addressing bioterrorism but not sensitive to this at present.
IFS Food industry	HACCP	Yes	Yes	None	Risk assessment within individual business, capable of addressing bioterrorism but not sensitive to this at present.
ISO 22 000 Primary production and food industry	Prerequisite GAP protocols for primary production HACCP for food industry	Yes Yes	No Yes	Developed as a whole chain solution	Does not require individual farm risk assessment of food safety but link to rest of chain (if also doing same standard) ensures HACCP further along chain. Not sensitive to bioterrorism issues
SQF 1 000 Primary production	Food Safety Plan based on HACCP principles	Yes	No unless SQF customer requires it	Part of whole chain solution if linked to SQF 2 000	Risk assessment done at farm level that links to SQF 2 000 HACCP, especially under multisite certification programmes. Food security module being developed for 2007.
SQF 2 000 Whole chain including, retail and food service	HACCP	Yes	Yes	Whole chain solution including retail and food service	Risk assessment within individual business, capable of addressing bioterrorism Food security module being developed for 2007

Source: authors' research.

At the farm level the GLOBALGAP standard does not focus on individual farm risk assessment, it relies on prerequisite programmes like Good Agricultural Practices and Hygiene or cleaning guidance. In contrast, SQF 1 000 requires food safety risk assessment to be carried out annually. Furthermore, SQF members will soon have access to the same food security module and guidance as those operating to the SQF 2 000 code. It is uncertain to what extent the farm level adoption of ISO 22 000 will require safety assessments based on HACCP.

The international standards evaluated offer different levels of whole chain communication. Most standards only operate at their designated level and do not necessarily link to standards upstream or downstream; the same can be said of the many national schemes we have benchmarked. The exceptions to this general rule are the linked SQF 1 000 and 2 000 codes and ISO 22 000 standards.

It appears from this review that only the SQF Institute has recognized and put in place actions to help the food industry come to terms with the potential threats arising from bioterrorism and deliberate contamination. The ongoing development of the food

security module, backed up by guidance and training will add another dimension to SQF food and farming businesses. In addition they have the potential to align more easily with public control measures.

There is a need for greater awareness and training in this area so that individuals and organizations understand the requirements of both routine and emergency biosecurity protocols at the company and supply chain levels, plus an awareness of how private systems should link with public safety surveillance and action. The value of developing integrated systems can be aptly demonstrated by reference to the following three cases.

### **Case 1: Spinach recall in the United States of America**

The recent national recall on spinach in the United States of America (September 2006) clearly shows the wide distribution of product emanating from a single farm business. Spinach packed by the Triple B Corporation was sourced from one Californian grower in the Salinas Valley (Natural Selection Foods) and was distributed across the States to retail stores and delicatessens. The *E. coli* contamination was believed to have originated from an alternative irrigation tank that had become contaminated. Whilst not suggesting terrorism here, the case shows how simple it could be to contaminate the salad supply chain and cause a national recall allied to public unrest.

What lessons can be learned? First, how should the grower have addressed and measured the risks? Was there a risk assessment of water supply and how frequently was this carried out? Secondly, did the packing and distribution of the spinach in plastic containers have a risk assessment within the packing HACCP plan? Finally, how would these risk assessments change in light of the threat of a terrorist attack? What did work well, however, was the traceability and product recall systems and the link to public procedures for food safety risks run by the Food and Drug Administration in this case.

### **Case 2: Potato supply to Walkers Crisps in the United Kingdom**

A recent visit to a contract grower demonstrated the cooperation on food safety between growers and food processors. Walkers have recognized that most consumers of crisps are children and that we all generally consume crisps without looking at them. Walkers were concerned about physical contamination (glass, metal etc) and recognized that the most effective way of removing the threat was by hand sorting (especially for glass). As the crisp process is automated, the last opportunity to sort is on the farm prior to bulk delivery. All consignments are now hand sorted on-farm and boxes security-sealed. Any delivery without a security tag is rejected. This case highlights the need for security sealing during periods when food or raw materials are not being supervised (i.e. during distribution).

### **Case 3: United Kingdom retailers**

This case refers to one retailer in the United Kingdom who supplied information in confidence (Gregson, 2006), so only an overview can be given.

#### ***The retailer***

The complex structure of global sourcing, central delivery and distribution and operations in the store define the core role of modern retailers. The distribution system

is complex as it must deal with thousands of products from many different suppliers (there can be between 15 000 and 30 000 lines in an average warehouse). Products will then be shipped daily to stores requiring a significant logistical effort. However, by allocating delivery and collection times the retailer knows who to expect both at the warehouse and at the store. Moreover, as only the retailer's lorries go to stores, the focus of safety management is at the warehouse.

### ***The suppliers***

The retailer has more than 1 500 suppliers, from the biggest global food brands such as Nestlé, Coca-Cola and Kraft, to small operations with few staff who may supply a single branch with a local speciality. This retailer's willingness to work with the very smallest boutique suppliers makes it unique amongst supermarkets, but it also presents food safety challenges. All suppliers are required to work to very strict manufacturing specifications that exceed the BRC Global Standard and comply with all relevant legislation. All suppliers are risk-assessed for safety compliance and legality, and inspected either by food technologists or by approved third parties. Within the very strict specification are rules and regulations concerning tamper-evident packaging. In other words, wherever achievable, food must be supplied in tamper-proof packaging. Traceability is another key part offered to customers. In high risk products such as meat and milk this is achieved through working closely with producer groups and by limiting the numbers of suppliers. Being a bespoke supplier is viewed as a long-term partnership and the retailer prides itself on knowing the origin of all its fresh produce for example.

### ***In the warehouse***

A schedule of deliveries is developed with appropriate time slots. It is the suppliers' responsibility to deliver to this schedule, and performance is judged on the accuracy with which they do this. The delivery driver carries a detailed schedule of the content of the load and the warehouse manager will have a similar manifest detailing the expected load. The two documents are laid out of sight as the lorry is unloaded, and then after the delivery is checked, the physical quantities are reconciled with both the delivery drivers' schedule and the warehouse schedule – this is called a blind check. Any discrepancies are recorded and logged for investigation. The delivery is scanned into the warehouse management system, which tells the warehouse operator where it should be placed – the warehouses are floor-mapped to increase the efficiency of the operation (maximizing use of space and minimizing the time taken during the pick and cage fill). This also provides an internal trace and recall system if needed. To increase the efficiency of the operation, the warehouse manager has a site control system that is programmed with exact delivery schedules. It calculates when a trailer has to complete its loading cycle around the site, giving warehouse operators exact loading and delivery schedules.

### ***The shop floor***

Retail stores are very busy environments with 15 000 to 30 000 lines offered for sale to customers. Behind the scenes, branch operations are strictly controlled with members of staff signing in and out of the building through a monitored entrance next to the staff office. All visitors must sign in, whether they enter the branch through the front (sign in at the customer service desk) or the staff entrance (sign in at the staff office) and badges must be worn at all times. The shop floor and behind-the-scenes areas are CCTV-

managed. Access to all non-public areas, including branch warehouses, is controlled and monitored. In addition all staff members are trained to be vigilant for suspicious activity in the store and are skilled at spotting key telltale behaviours often associated with shoplifting or tampering. In addition, checkout staff are trained to check that goods passing through their tills are not damaged (the most obvious manifestation of this training is when they check eggs to make sure they are not broken). Although this is mainly aimed at providing good customer service, it is useful aid in spotting products that may have been tampered with. Modern tamper-proof packaging, required wherever possible under this retailer's terms of business, also makes the checkout operative's job easier. Indeed, the inspection of products that have been interfered with is easier for products packaged in this type of packaging.

This retail case shows how the various stages of the chain can be integrated and the types of checks that are made to ensure food safety. Though not designed to respond to a terrorist attack, the system outlined would be capable of developing a rapid and coordinated response as was demonstrated by their response to the recent Sudan 1 and other contamination incidents in Europe. We would argue that increasing the awareness of key staff to the risks and probability of deliberate contamination events allied to training in response procedures would further improve the system now in place.

### **Conclusions**

Deliberate food contamination can have significant impacts locally, regionally, nationally and internationally. International impacts are especially important as the globalization and consolidation of food procurement increases against public controls that remain national or at best regional. Although the threat of deliberate contamination is largely theoretical, it is possible to contaminate food in a country where controls are limited in order to cause major human health consequences and economic disruption. As food supply chains increasingly work on short lead times, the impact on the general public of such an incident would be large-scale and immediate, especially if measures are not in place to switch to an alternative supply chain.

Plant and animal health issues, deliberate contamination of the water supply or the food supply chain on a regional or even national scale requires a coordinated approach. National strategies should be developed in association with industry specialists to enable harmonized public-private strategies to evolve.

At the same time, individual food businesses and discrete supply chains should review their risk assessments to include the possibility and potential threat of deliberate contamination and food terrorism. This may be articulated through their individual and linked HACCP plans and be further supported through prerequisites like security-locked distribution, tracking and the use of tamper-proof packaging. If a threat is considered likely, then key staff should be trained in this area and emergency strategies practised. Finally, effective communication strategies are needed between food businesses, public bodies and consumers.

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