

Apple and tomato chains in China and the EU



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Xiaoyong Zhang
Huanguang Qiu
Zhurong Huang

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This study seeks to assess the comparative advantages of horticultural commodities in the EU and China. The assessment is determined on the basis of natural endowments, farm structure, and marketing and policy in the EU and China. Detailed analysis was carried out for both the fresh apple export and for the tomato paste chain from China. The research results indicate that both chains are highly integrated and various governance mechanisms are applied along the chains. Although it is unrealistic for the EU to export large quantities of horticultural products to China, the EU does have the potential to identify niche markets for EU produce exports to China.

Deze studie is erop gericht de comparatieve voordelen met betrekking tot tuinbouwproducten in de EU en China te beoordelen. Hierbij wordt gekeken naar natuurlijke hulpbronnen, bedrijfsstructuur, marketing en het beleid in de EU en in China. Er is een grondige analyse gemaakt van de export van verse appels en van de keten voor tomatenpuree van China. Uit de onderzoeksresultaten blijkt dat de twee ketens in hoge mate geïntegreerd zijn en dat er diverse beheersmechanismen op de ketens worden toegepast. Hoewel het niet realistisch is dat de EU grote hoeveelheden tuinbouwproducten naar China zal exporteren, heeft de EU wel de mogelijkheid om nichemarkten te identificeren voor het exporteren van EU-producten naar China.

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Photo: Chalkis Co

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Preface

It is a monumental challenge to analyse the nature of changes occurring in China's economy as a whole, specifically within the agricultural sector, alongside the various institutional shifts and policy changes that are currently being implemented. The EU 6th framework project entitled 'Chinese Agricultural Transition: Trade, Social and Environmental Impacts' (contracting number 44255) aims to investigate the impact of China's current economic transition on its agricultural economy with special reference to the consequences of trade liberalisation and of the changing trade flows. More information regarding this project can be found at www.catsei.org.

This report describes the result of the commodity-specific assessments within the work package 2 Trade. The commodity study forms one of their four deliverables of this package. Since only a limited set of commodities may be analysed in detail, a key challenge is to identify commodities that are both currently relevant - and will be relevant to the industry in the future. Further to consultation with policy makers and other stakeholders, we chose apples and tomatoes as the ideal case studies of commodity chains for detailed assessment.

Dr. Xiaoyong Zhang from LEI, part of Wageningen UR, headed this study, with the valuable input from Dr. Huang Huanguang and Mrs. Huang Zhurong, both from the Centre for Chinese Agricultural Policy, Chinese Academy of Sciences. During the fieldwork significant stakeholders were interviewed within the apple and tomato chains in both the EU and China. We hereby wish to thank all the individuals who generously shared their insights with us: Mr. Thijs Jansen from Van Rijn, Mr. Jan Taks from AWETA, Mr. Yang and Mr. Xue from Xingxing, Mr. Andrew Yu from COFCO, Mr. Wang Xiaodong from Chalkis, Mr. Richard Leung from Alfa, Mr. Shi from Qixia, and Mrs. Zhang from Costa. We would also like to present our gratitude to the numerous apple and tomato farmers who spent their valuable time with us. We particularly thank to Gé Backus and Wim van Veen for their valuable comments on the final report. Finally, we gratefully acknowledge the support from the project team: Jikun Huang, Marijke Kuiper and Hans van Meijl.

We hope that this report will provide valuable insight into the comparative advantages of the apple and tomato supply chains in the EU and China, and serve as a model in assessing fruit and vegetable trade between these entities.

A handwritten signature in black ink, appearing to read 'R.B.M. Huirne', written in a cursive style.

Prof. Dr R.B.M. Huirne
Managing Director LEI

Summary

This report describes the comparative advantages of horticultural products between the EU and China with a special focus on the apple and the tomato supply chains. The assessments are based on farm structure (type and scale of farms, production costs and productivities, et cetera), the institutional setting (marketing system, producers' organisations), and public policies (fiscal policies and protection measures, et cetera). Detailed analysis is carried out for two commodity export chains from China: the fresh apple chain and the tomato paste chain.

Farm structure

When compared with EU's 13m agricultural holdings, the number of 256m Chinese family farms is substantially larger. The same pattern holds for the labour forces when comparing the 11m EU farm labour work force with the 520m farmers in rural China. Comparing Dutch data (for the EU) with Shandong province data (for China) reveals that an average apple orchard in the Netherlands covers about 6ha, much larger than the 4mu (0.27ha) in Shandong. The same holds for the tomato farms, with an average of 3.6ha in the Netherlands, compared to an average of 3mu (0.20ha) in Shandong.

Productivity

Although the production quantity of tomatoes and apples in China has increased sharply in recent years, the productivity is still low when compared with production in industrialised countries. The tomato yield in leading producing countries such as the Netherland is nearly twenty-fold higher than that in China (4,451 vs. 231 tonnes per hectare in 2007), whilst apple yield in China is about one-third of that in France and the Netherlands.

Production costs

The average input of a horticultural farm in the EU is between €0.5m to €1m per year, whilst in China it is less than €1,000 for a horticultural farm. Horticultural farming in EU is extremely capital intensive. The labour costs accounts for 38% of the total apple production costs in China, which is higher than the average 20% of labour costs in the horticultural farms in the Netherlands. Although rural China has a vast labour force, the labour costs have increased rapidly in

recent years due to the migration from rural areas to the city. Meanwhile, the producer prices for Chinese apples have reached the international level, whilst the producers' price for Chinese tomatoes still remains far below international level. Chinese apple trade has a small comparative advantage on international markets whilst Chinese tomato processing industry will expand as long as the prices remain relatively low.

Marketing channels

The concentration of supermarkets at retail level has strong implications for the whole food distribution system in the EU. It creates entry barriers for suppliers since only firms with sufficient resources and critical mass are able to bear the costs and risks when negotiating with large supermarket groups. In response, the limited number of large suppliers works closely together with upstream wholesalers and producers on quality and quantity issues. On the other hand, wholesale markets play a pivoting role in the distribution system of fruit and vegetables in China. The wholesale markets function as 'product assembly' locations for producers and distribution centres for wholesalers. As a whole, the role of supermarkets is still limited for the fruit and vegetable distribution in China.

Agricultural policies

Although both China and the EU provide subsidies to their agricultural sector, Chinese public policies based on subsidies are still in their infancy (currently only 5 years old) whilst the agricultural subsidies in the EU can be traced back more than five decades. Furthermore, agricultural subsidies in China are still in the phases of trials for selected crops or activities, whilst the EU policy is much more comprehensive and is moving away from market support to direct income support to farmers. Furthermore, the EU policy covers a much broader scope, such as subsidies related to both environmental safeguards and consumption promotion.

The fresh apple chain in China

More than 42% of all apples produced in the world originate in China. China is by now the leading player with a 14% share in global apple exports. The case study on the major apple exporting region Shandong illustrates that the apple industry development truly reflects the impact of globalisation on China as a whole. It indicates a clear path that began with domestic marketing liberalisation, increased production, the pursuit of product quality, penetration into inter-

national markets, and the cultivation of domestic markets, et cetera. This leads to the first observation that globalisation is beneficial to improving food safety and quality in China. The second observation is that China has responsive institutional mechanisms that respond to the international demand for food safety and quality extremely efficiently, at least for the apple export segments.

The tomato paste chain in China

Although the Chinese tomato paste entered the international market a decade later than apples, its development was even more extreme. China now accounts for one third of the total tomato paste trade worldwide. Contrary to the fragmentation of the fresh apple export business, tomato paste processing in China is dominated by two giants from Xinjiang: Tunhe and Chalkis. Together they take up 70% of the domestic market share. However, they do have different approaches towards penetrating international markets. Whilst Tunhe is targeting the international high-end industrial markets, Chalkis focuses on end-consumer markets. The current overcapacity in tomato paste plants and the distrust between processors and tomato farmers are major challenges facing the future development of the tomato paste industry in China.

Recommendations

Although there is a major trade imbalance between the EU and China in fresh produce, there are signs of a more balanced development. Several protocols for Chinese imports of EU fruits have either been completed or are being negotiated: apples from France, citrus fruit from Spain, kiwi fruit from Italy and pears from the Netherlands. Opportunities exist on both sides. On the basis of mutual beneficial principles, the following recommendations have been formulated:

- Enhance the organisation of primary producers in China: It is evident that the fragmented production system in China is a major bottleneck in product quality improvement. Although new agricultural cooperatives laws were adapted recently, the current newly established cooperatives are far from autonomous and do not reflect well-established organisations controlled by their members. The Chinese may learn from the cooperative development in EU with its history of more than two centuries;
- Encourage greater transparency in China: Private sectors in the EU often complain of the nontransparent system in China concerning Sanitary and Phytosanitary (SPS) issues. It refers to the lack of information on procedures and the unclear task divisions between national and provincial competencies.

Thus the EU is calling upon the recognition of EU controls in China and relaxation of registration procedures for plants and seed materials;

- Market diversification: The EU's fresh produce markets are saturated, with declining prices over the last few years. China should seek new market opportunities beyond the EU, such as the Middle East and Africa. More and more private sectors are realising that these markets are relatively easy to operate with reasonable profitability;
- Focus on quality and image: It is unrealistic to export a large volume of fresh produce from the EU to China. However, for selected products that focus on top-end consumers it is possible for EU exporters to establish niche markets in China. Consumers in these segments are able to pay premium prices for quality products.

Samenvatting

In dit rapport worden de comparatieve voordelen van tuinbouwproducten in de EU en China beschreven met speciale aandacht voor de toevoerketen van appels en tomaten. De beoordelingen zijn gebaseerd op bedrijfsstructuur (type bedrijf en schaal, productiekosten en productiviteit, enzovoort), de institutionele omgeving (marketingsysteem, producentenorganisaties) en overheidsbeleid (fiscaal beleid en beschermingsmaatregelen, enzovoort). Er is een gedetailleerde analyse gemaakt van de toevoerketen van twee exportproducten van China: verse appels en tomatenpuree.

Bedrijfsstructuur

In vergelijking met de 13 miljoen landbouwbedrijven in de EU telt China er aanzienlijk meer met zijn 256 miljoen familiebedrijven. Datzelfde geldt voor het aantal arbeidskrachten: de EU heeft 11 miljoen arbeidskrachten in de landbouwsector en het Chinese platteland telt 520 miljoen landbouwers. Als we de Nederlandse gegevens (voor de EU) vergelijken met de gegevens van de provincie Shandong (voor China), blijkt dat een gemiddelde boomgaard in Nederland zo'n 6 ha beslaat; in Shandong is dat slechts 0,27 ha. Datzelfde geldt voor de tomatenbedrijven met een gemiddelde van 3,6 ha in Nederland ten opzichte van gemiddeld 0,20 ha in Shandong.

Productiviteit

Hoewel de productiehoeveelheid van tomaten en appels in China de laatste jaren sterk is toegenomen, is de productiviteit nog altijd laag in vergelijking met de productie in geïndustrialiseerde landen. De tomatenopbrengst in de belangrijkste productielanden, zoals Nederland, is bijna 20 keer groter dan de opbrengst in China (4451 ten opzichte van 231 tonne per hectare in 2007) en de appelopbrengst in China is ongeveer een derde van de opbrengst in Frankrijk en Nederland.

Productiekosten

De gemiddelde input voor een tuinbouwbedrijf in de EU ligt tussen 0,5 miljoen en 1 miljoen euro per jaar, terwijl dat in China minder dan 1.000 euro is. Tuinbouw in de EU is extreem kapitaalintensief. De arbeidskosten voor appels in China maken 38% uit van de totale productiekosten, wat hoger is dan de ge-

middelste 20% aan arbeidskosten voor tuinbouwbedrijven in Nederland. Hoewel het Chinese platteland over een groot aantal arbeidskrachten beschikt, zijn de arbeidskosten de laatste jaren snel toegenomen door de migratie van het platteland naar de stad. Inmiddels heeft de productieprijs voor Chinese appels het internationale niveau bereikt, terwijl de productieprijs voor Chinese tomaten nog altijd ver onder het internationale niveau zit. Chinese appels hebben dus nog maar een klein relatief voordeel op de internationale markten, terwijl de Chinese tomatenverwerkingsindustrie zal blijven groeien zolang de prijzen relatief laag blijven.

Marketingkanalen

De concentratie van supermarkten op retailniveau is van grote invloed op het hele voedseldistributiesysteem in de EU. Dit zorgt voor toegangsbelemmeringen voor leveranciers omdat alleen bedrijven met voldoende bronnen en kritische massa in staat zijn om de kosten en risico's te dragen die komen kijken bij het onderhandelen met grote supermarktketens. Naar aanleiding daarvan werkt het beperkte aantal grote leveranciers nauw samen met upstream-groothandelaars en -producenten aan kwaliteit- en kwantiteitskwesties. Anderzijds spelen wholesalesmarkten een essentiële rol in het distributiesysteem voor fruit en groenten in China. De wholesalesmarkten functioneren als verzamellocaties voor producenten en als distributiecentra voor groothandelaren. Over het geheel genomen is de rol van supermarkten op het gebied van distributie van fruit en groenten in China nog altijd beperkt.

Landbouwbeleid

Hoewel zowel China als de EU de landbouwsector subsidiëren, staat het Chinese overheidsbeleid op het gebied van subsidies nog steeds in de kinderschoenen (het bestaat op dit moment 5 jaar), terwijl de landbouwsubsidies in de EU al meer dan vijftig jaar bestaan. Bovendien bevinden de landbouwsubsidies in China zich nog altijd in een testfase en worden ze alleen ingezet voor bepaalde gewassen of activiteiten, terwijl het EU-beleid veel breder is en zich langzamerhand verplaatst van marktondersteuning naar directe inkomenssteun aan boeren. Daarnaast beslaat het EU-beleid een veel groter gebied; zo zijn er ook subsidies ten behoeve van milieubescherming en consumptiestimulering.

De keten voor verse appels in China

Meer dan 42% van alle appels die wereldwijd worden geproduceerd, zijn afkomstig uit China. Met een aandeel van 14% in de wereldwijde appelexport is China

op dit moment de grootste speler. Een casestudy naar een belangrijk gebied voor de appelexport (Shandong) illustreert dat de ontwikkelingen in de appelsector een realistische weerspiegeling vormen van de impact van globalisering op China als geheel. Er is een duidelijke lijn te zien die begon met de liberalisering van de binnenlandse markt, een hogere productie, de verhoging van de productkwaliteit, de penetratie van de internationale markten, de ontwikkeling van nieuwe binnenlandse markten, enzovoort. Dit leidt tot een eerste observatie dat de globalisering een gunstige uitwerking heeft op de voedselveiligheid en -kwaliteit in China. De tweede observatie is dat China over institutionele mechanismen beschikt die zeer efficiënt reageren op de internationale vraag naar voedselveiligheid en -kwaliteit, zeker in de appelexport.

De keten voor tomatenpuree in China

De Chinese tomatenpuree kwam weliswaar tien jaar later op de internationale markt dan appels, maar de ontwikkelingen in dit segment vonden nog sneller plaats. China heeft nu wereldwijd een derde van de totale handel in tomatenpuree in handen. In tegenstelling tot de fragmentatie in de exportsector van verse appels wordt de verwerking van tomatenpuree in China gedomineerd door twee giganten uit Xinjiang: Tunhe en Chalkis. Samen hebben zij een aandeel van 70% op de binnenlandse markt. Ze hanteren echter beide een andere aanpak om de internationale markten te penetreren. Tunhe richt zich op de internationale hoogwaardige industriële markten, terwijl Chalkis zich op de eindgebruikersmarkten richt. De huidige overcapaciteit in tomatenpureefabrieken en het wantrouwen tussen verwerkers en tomatenbedrijven vormen een grote uitdaging voor de verdere ontwikkeling van de tomatenpureesector in China.

Aanbevelingen

Hoewel de handel op het gebied van versproducten tussen de EU en China duidelijk in onbalans is, zijn er tekenen van een gebalanceerdere ontwikkeling. Er zijn al enkele protocollen voor de export van fruit uit de EU naar China afgerond en over andere wordt nog onderhandeld: appels uit Frankrijk, citrusvruchten uit Spanje, kiwi's uit Italië en peren uit Nederland. Er zijn kansen voor beide partijen. Uitgaande van voordelen voor beide landen kunnen de volgende aanbevelingen worden geformuleerd:

- Verbeter de organisatie van primaire producenten in China: het is duidelijk dat het gefragmenteerde productiesysteem in China een belangrijk knelpunt is voor het verbeteren van de productkwaliteit. Hoewel er recentelijk nieuwe wetten zijn aangenomen op het gebied van landbouwcoöperaties, zijn de

huidige nieuw gevestigde coöperaties verre van autonoom en zijn het geen sterke organisaties die door hun leden worden bestuurd. De Chinezen kunnen misschien wat leren van de ontwikkeling van de al 200 jaar bestaande coöperaties in de EU.

- Stimuleer meer transparantie in China: de private sectoren in de EU klagen vaak over het niet-transparante systeem in China op het gebied van sanitaire en fytosanitaire kwesties. Dat heeft te maken met het gebrek aan informatie over procedures en de onduidelijke verdeling tussen nationale en provinciale bevoegdheden. De EU vraagt nu om erkenning van de controlemethoden van de EU in China en een versoepeling van de registratieprocedure voor fabrieken en zaadmateriaal.
- Marktverbreding: de EU-markten voor versproducten zijn verzadigd en de prijzen zijn de laatste jaren gedaald. China moet nieuwe marktkansen zoeken buiten de EU, bijvoorbeeld in het Midden-Oosten en Afrika. Steeds meer private sectoren realiseren zich dat ze relatief eenvoudig op deze markten kunnen opereren met een redelijke winstgevendheid.
- Focus op kwaliteit en imago: het is niet realistisch om grote hoeveelheden versproducten uit de EU naar China te exporteren. Voor bepaalde producten die gericht zijn op rijke consumenten kunnen EU-exporteurs echter niche-markten in China ontwikkelen. Consumenten in deze segmenten kunnen hogere prijzen betalen voor kwaliteitsproducten.

1 Introduction

1.1 General

In just two decades, China has made a remarkable leap from being a small fruit and vegetable apple producer to becoming the world's largest apple producer and exporter. In the early 1980s, China produced under 3m tonnes of apples per year. By 2007, more than 42% of all apples produced in the world originated in China (FAO, 2008). Due to its rapid expansion of apple orchards in the late 1980s, notably in the Shandong and Shaanxi provinces, China is now the leading player with a 13.5% share in the global apple exports by volume; ahead of other apple exporters such as Italy (10.4%), Chile (10.3%), France (9.2%) and the US (8.8%) (Un Comtrade, 2007). In monetary terms, total Chinese apple exports ranked fourth behind Italy, France and the US, since China's apples sell at lower prices in international markets. The tomato processing industry gives the same picture. Within two decades, China has emerged from nowhere to being the leading tomato paste exporter in the world.

China has been able to connect millions of small-scale apple producers at the primary production segment of the supply chain with modern sophisticated western consumers at the other. Policy makers and agribusiness managers in economies with many smallscale agricultural producers might benefit from China's experiences that show that small-scale farmers can be integrated into a modern supply chain. Prior research by Elizabeth et al. (2000) and Dolan and Humphrey (2001) suggested that small farmers tended to be excluded from the modern marketing chains. Other studies showed that the emergence of modern supply chains produced increased interaction between buyers and small farmers in developing countries (Dries et al, 2004; Maertens and Swinnen, 2006; Huang et al., 2008). Several recent studies reported that farmer cooperatives, government interventions restraining purchasing powers, and increased farm contact were all ways of improving small farmers' market involvement and bargaining powers (Gibbon, 2003; Gulati et al., 2006; Devesh and Thorat, 2008). Roy and Thorat (2008) reported on a unique success story, namely that of the Mahagrapes, which shows how farmer cooperative partnerships successfully combined collective action and public-private partnerships. They found that smallholder Mahagrapes farmers included in the process were able to consis-

tently meet market standards and benefitted from significantly higher incomes. This implies that the model may be scaled up.

This study reports on two cases from China: the apple export chain in the Shandong province and tomato processing chain in the Xinjiang Autonomous Region. The Shandong region accounts for half of China's total fresh apple exports and the area around Qixia city provides most of the apples exported from the Shandong region. Xinjiang is the main tomato producing region in China with a unique focus on tomato processing. The tomato paste export from Xinjiang accounts for more than 70% of the domestic market share.

1.2 Methodology

Two qualitative research techniques were applied in this study: focus group discussions, and individual in-depth interviews. In the focus group discussions groups, five to twelve selected individuals discussed a range of topics while the conversation was moderated by a facilitator. The individual in-depth interviews were unstructured personal interviews using extensive probing questions to get a single respondent to talk freely and to express detailed beliefs and feelings on a topic (Webb, 1995). Advantages and disadvantages of group versus individual interviews have been discussed extensively (Crabtree and Miller, 1993; Stokes and Bergin, 2006). While focus groups are more applicable to wide-ranging exploratory research, individual interviews allow probing the respondent for underlying motivations and feelings (Malhotra, 1999; Hennink, 2007). Thus using both techniques helps to achieve a broad overview and detailed understanding of the issues discussed (Stokes and Bergin, 2006; Gellynck and Kühne, 2008).

The combination of these two qualitative research methods enabled us to gain insights into the patterns of the apple and tomato supply chains from the perspective of the producers, processors and traders themselves. The focus group discussions were applied to apple and tomato growers while in-depth interviews were applied to other actors at different stages of the chains, including local collectors, exporter, agents, auctioneers, importers and policy makers.

The guidelines for focus group discussions and in-depth interviews were developed based on literature reviews of global commodity chains and the authors' extensive field experience in China. The central topic for producers' group discussions was understanding how producers were linked with export chains. These discussions also sought clarification on the reasons producers participated in certain ways, what the external influencing factors were in making their

choices, and what the consequences were for the producers' choices. The focus group interviews were carried out in July 2008. All sessions were audio-taped and the researchers recorded notes. After each session, the data were verified among the research team and transcribed.

The in-depth interviews for other chain actors covered sector characteristics, changes and developments across the chain, chain governance, et cetera. The interview questions were formulated based on reviews of global commodity chains and the authors' extensive field experience in China. They were then fine-tuned based on consultations with horticultural chain experts in China and in the Netherlands. The questions were then translated into Chinese. The interviews in the Netherlands were conducted in February and March 2008. Data collection in China was carried out during July 2008.

1.3 Structure of the report

This report is organised as follows. After the general introduction on the background and the methodology in Chapter 1, Chapter 2 assesses apple and tomato chains in terms of farm structure, production, marketing and policy the EU and in China. A detailed apple export chain and the related institutional arrangements are mapped out in Chapter 3. This is followed by Chapter 4 in which issues relevant to the tomato processing chain are presented. The report concludes with policy implications and recommendations.

2 Commodity assessments of the apple and tomato chains in the EU and china

2.1 Overview of bilateral trade in fruit and vegetables between the EU and China

Both the EU and China are large global players in the fruit and vegetable sectors with the EU as the traditional player and China as the newcomer. The EU is the world's second largest fruit and vegetable exporter after the US, but ahead of China, and the largest importer, ahead of the US and Japan. The fruit and vegetable production in China has rapidly developed since the mid-1980s. China by now produces over a third of all fruit and vegetables in the world, making it the largest global producer of fruit and vegetables. According to FAOSTAT, China was the leading apple and pear producer in 2007, accounting for 43% and 45% respectively, of the world's and total output.

The leading suppliers to the EU fruit and vegetable markets are Turkey, which supplied 11.2% of the EU market in 2007, followed by the US (7.9%), China (7.3%), Brazil (6.5%) and South Africa (6.1%) (Eurostat). Germany, the UK and the Netherlands are the leading importers within the EU member countries, which import mostly tropical fruits (such as bananas, pineapples and mangos) and off-season vegetables (such as tomatoes and sweet peppers). The main destination for China's fruit and vegetable exports are Asian markets, which include Japan, Hong Kong, South Korea and Singapore, followed by EU and Russia. Compared with its export, China imports a modest amount of fruit and vegetables, mainly from Thailand, Vietnam and the USA.

Although the EU is not the major destination for China's fruit and vegetable exports, some products, such as apples and pears, are exported to the EU at an increasing rate. Table 2.1 presents the top ten traded fruit and vegetable products between the EU and China in 2007. The leading Chinese vegetables to the EU markets are beans and garlic while strawberries and apples are the major exported fruits to the EU. Compared to its export value, China's import from the EU is limited to some berries, mainly cranberries and cherries. The leading importing countries in the EU for the Chinese fruit and vegetables are Germany, the Netherlands and Italy, followed by Spain, the UK and France. The picture of

the exporting countries to China is quite different from the importing ones since mainly northern countries such as Sweden and Finland export wild berries.

Chinese Exports to the EU		Chinese Imports from the EU	
variety	value (USD1,000)	variety	value (USD1,000)
Beans (<i>Vigna spp. Phaseolus spp.</i>)	87,748.894	Cranberries	1,475.128
Garlic	65,749.466	Cherries	882.034
Strawberries (<i>frozen</i>)	59,250.539	Peas	645.521
Apples	31,022.582	Chestnuts	538.547
Grapefruits	29,565.129	Raspberries	409.991
Walnuts	23,786.501	Onions	343.657
Mushrooms and truffles	23,580.167	Olives	277.944
Pears and quinces	11,477.479	Mixtures of nuts or dried fruit	136.944
Leguminous (leguminous) vegetables	11,011.754	Strawberries (frozen)	86.071
Dried vegetables	8,448.997	Peel of citrus fruit or melons	58.419

Source: Uncomtrade.

2.2 Farm structure of apple and tomato production in the EU and China

2.2.1 Overview

There are 13m farms in the EU 27 member countries with an average size of about 12ha. Seventy percent of these farms have less than 5ha, and about 6% are over 50ha in surface (Eurostat, 2007). Table 2.2 indicates a trend for the larger scale category (above 50ha) whilst the number of smaller scale farms has been decreasing over the years. This trend resulted in an increase of the average farm size from 11.50ha in 2003 to 12.59ha in 2007. Total labour input is equivalent to about 11m full-time employees in 2007. This also points to a declining tendency over the years.

Items	2003	2005	2007
Total number of agricultural holdings (1,000)	1,5021.03	1,4482	1,3700.4
Of which: <5ha	10,959.45	10,349.15	9,644.82
5-<20ha	2,538.08	2,615.1	2,553.16
20-<50 ha	835.08	825.95	804.31
>=50ha	688.42	691.8	698.11
Total farm labour force (1,000 AWU) a)	13,350.38	12,715.57	11,693.13
Average farm size (ha)	11.50	11.88	12.59

a) One AWU equals the work of a full-time employee.
Source: Eurostat.

Since the policy implementation of the so-called Household Responsibility System in China at the end of the 1970s, individual households became the basic production unit. There were about 256m family farms in China in 2008, with a slightly increasing trend over the years. The average farm size is about 7.11mu, an equivalent of 0.47ha per household. The total available labour force was around 520m in 2008. It must be emphasised that this figure refers to the total number of rural workers between 16 and 60 years old while the primary agricultural labour force was around 283m. The rest are engaging in other value added activities or migrating to work in the cities on a part-time or full-time basis.

Items	2003	2005	2007	2008
Total number of family farms (million)	247.93	252.22	254.35	256.64
Total rural labour force (million)	489.71	503.87	514.36	520.26
Total agricultural force (million)	312.59	299.75	286.40	283.63
Average farm size (mu/household) a)	7.87	7.73	7.18	7.11

a) These data is obtained by dividing the total arable land in China by the total number of family farms in row 1.
Source: Agricultural Statistics Summary (2008), Ministry of Agriculture, China.

2.2.2 Apple farm structure

The EU-27 orchard survey carried out in 2007 provided data on the apple production structure in the EU by country, variety, density class and tree age class (Ollier et al., 2009). Among the seven species of fruit trees, apple trees account

for more than one third of the total surveyed European orchard area. The two largest areas of apple trees were found in the new member countries, Poland and Romania. The Mazowieckie area accounts for 40% of the apple tree area in Poland. If the average number of apple trees per hectare by age class according to the planting year is compared, German and Italy have the higher plantation density, while Poland shows an increasing density of apple trees over the years. The age class distribution of apple trees reveals that the orchards from Belgium, Luxembourg and the Netherlands can be called 'young', with over 60% of the apple trees under 10 years old, which is a good sign of innovation. In comparison, countries such as Estonia and the Czech Republic have relatively 'old' apple orchards where a substantial part of the apple trees are over 25 years old. More than two dozen apple varieties are planted in the EU-27 member countries. The leading varieties are Golden Delicious, Gala, Idared and Red delicious.

Figure 2.1 illustrates the development of apple holdings in the Netherlands from 1985 to 2007. Over the last two decades, the number of apple holdings has reduced by more than 60%, from 4,260 in 1985 to 1,600 in 2007 (Bremer, 2009). The sharpest reduction comes from the smallest scale production (less than 2ha) while the number of larger holdings (larger than 10ha) is increasing. The average cultivated area per holding has increased from about 3.5ha in 1985 to about 6 ha in 2007.

No official data are available on the Chinese farm structure at the individual crop level. To shed light on the apple and tomato production structure, survey data from the Centre for Chinese Agricultural Policy (CCAP) from 2006 were used. Table 2.4 shows that two thirds of apple farms have an orchard size between 2 and 8mu. Only around 8% farms have an orchard size above 8mu.

Figure 2.1 Composition of apple holdings in the Netherlands, 1985-2008

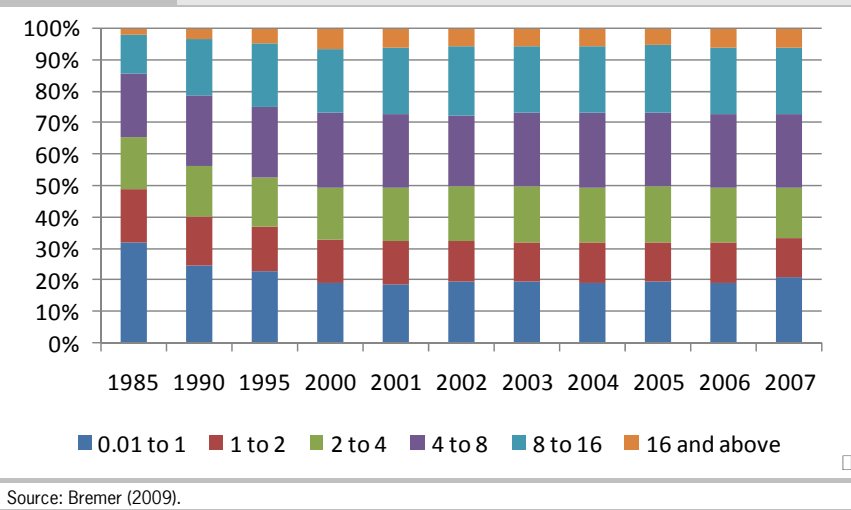


Table 2.4 Composition of apple farms in Shandong, China, 2006 (mu)

	Number	Proportion %
0.1-1	9	3.3
1-2	57	21.0
2-4	98	36.2
4-8	86	31.7
Above 8	21	7.7
Total	271	100

Source: CCAP survey (2006).

2.2.3 Tomato farm structure

Tomato production plays an important role in the EU's agricultural economy and accounts for 15% of the total volume of vegetables (EC, 1996). In addition to the traditional round tomatoes, high value-added varieties such as stalk tomatoes, cherry tomatoes and beef tomatoes, have become attractive. Spain and the Netherlands are representative of tomato producers in the southern and northern EU region. The largest vegetable producing region in Europe is in Almería in Spain. In the Almería region, the most dominant agricultural commodities are tomatoes, peppers, eggplants, et cetera, which are produced in

Spanish-style flat-roof greenhouses. Most of these greenhouse operations are family-owned and require low capital investment (Cantliffe and Vansickle, 2003).

Compared with the greenhouses in Spain, Dutch greenhouses are more sophisticated. The main horticultural production in the Netherlands is concentrated in the Westland region. Soilless hydroponic systems and energy-saving thermal screens are widely used, whilst modern holdings are equipped with computer-controlled trickle irrigation systems and climate control (Li, 2009). Table 2.5 presents the total number of tomatoes holdings under greenhouses by farm size in the Netherlands. The number of farms larger than 3ha has increased substantially over the years whilst the number of smaller scale farms is declining over the same period. Due to the application of optimal production, a yield of 50-60kg of tomatoes per m² per season (November-September) is not exceptional (Li, 2009).

Table 2.5		Tomato holdings under glass by size in the Netherlands (ha)								
	0.01-0.25	0.25-0.5	0.5-0.75	0.75-1	1-1.5	1.5-2	2-3	3 above	Total holdings	Total areas in ha
<i>Round and beef tomatoes</i>										
2006	82	7	6	10	18	15	33	34	205	386
2007	79	4	6	9	15	13	30	37	193	413
2008	70	5	4	6	14	8	27	39	173	422
<i>Stalk tomatoes</i>										
2006	15	2	2	12	30	32	44	117	254	1,007
2007	11	2	4	11	27	25	35	119	234	1,034
2008	15	3	3	7	23	16	31	125	223	1,078
<i>Cherry tomatoes</i>										
2006	21	-	1	-	6	2	4	8	42	88
2007	18	2	-	1	6	2	5	7	41	98
2008	19	1	-	1	6	2	6	8	43	100
Source: LEI (2009).										

Tomato is an important vegetable crop widely cultivated in China. Tomatoes are grown mainly in open fields, whilst the use of plastic tunnels is becoming popular in the north of China. The leading tomato production province is Hebei

with a production of 5.5m tonnes in 2006, followed by Henan and Shangdong (Table 2.6).

Provinces	Sown area (1,000ha)	Production quantity (10,000 tonnes)	Yield/hectare (kg)
Hebei	85.2	554.5	65,081
Henan	109.7	509.6	46,455
Shandong	82.3	508.0	61,725
Xinjiang	66.3	490.1	73,916
Jiangsu	48.4	176.7	36,512
Liaoning	23.7	169.0	71,312
Hubei	38.3	130.3	34,025
Shanxi	22.6	110.4	48,865
Sichuan	40.2	103.5	25,746
Guangxi	45.5	102.6	22,542

a) Since 2007 China ceased to collect data for each vegetable specie, so 2006 data are used.
Source: Agricultural Statistics Summary 2006, Ministry of Agriculture, China.

We again make use of CCAP's survey in Shandong province to illustrate the tomato production structure in China (Table 2.7). Amongst the 229 farms surveyed in Shandong, more than two thirds of these farms has a tomato production area of 1mu to 4mu. Only 4% of tomato farmers have a production area above 8mu.

	Number	Proportion %
0.1 to 1mu	17	7.4
1 to 2mu	82	35.8
2 to 4mu	89	38.9
4 to 8mu	32	14.0
above 8mu	9	3.9
Total	229	100

Source: CCAP survey (2006).

2.2.4 Comparisons

Compared with the EU's 13m agricultural holdings, the figure for China of 256m family farms is considerably larger. The same pattern holds when comparing their labour force: 11m EU farm labourers compared to 520m of Chinese rural workers. Due to the lack of apple and tomato farm size data at both the EU and Chinese national level, we compare the Dutch data from the EU with Shandong data in China. The average apple orchard in the Netherlands is about 6ha, a far higher surface area than the 4mu (0.27ha) in Shandong. The same difference holds for the tomato sector, with an average of 3.6ha per farm in the Netherlands against an average 3mu (0.20ha) in Shandong.

2.3 Production of apples and tomatoes in the EU and China

2.3.1 Apple production

Asia and Europe, with 62% and 27% of the world cultivated areas respectively in 2007, were the two main apple producing regions. During that same period, the USA contributed only 3%, Africa 2.5% and Oceania 0.6% to the world's cultivated apple producing area (FAOSTAT, 2007). Table 2.8 presents the world's main apple producing countries in 2007. China, with an output that exceeds 20m tonnes, represents 43% of the world production, followed by the USA and Iran with 4.2 and 2.6m tonnes respectively.

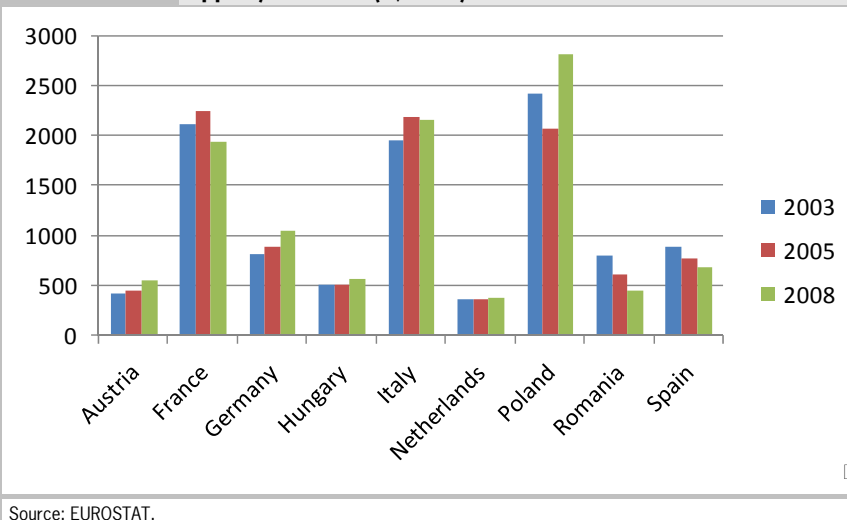
Country	Production (m tonnes)
China	27.0
USA	4.2
Iran	2.6
Turkey	2.3
Russia	2.2
Italy	2.1
India	2.0
France	1.8
Chile	1.4
Argentina	1.3

Source: FAOSTAT (2007).

The apple production in the EU has stabilised over the last 5 years. Amongst the top 10 apple producers in the world, three are in the EU: Italy, France and Poland. The total EU apple production was 13.9m tonnes in 2007 and accounted for 22% of the world's total apple production (Faostat). Figure 2.2 presents Italy, France and Poland as the leading apple producers in the EU, accounting for nearly 50% of the total EU apple production between 2003 and 2007. In 2008, with a production of 2.83m tonnes, Poland overtook Italy (2.16m tonnes) and became the largest apple producer in the EU.

Apple production in China took off in the 1980s when China liberalised its domestic markets. The rapid expansion of apple cultivation in China started from less than 3m tonnes to over 25m tonnes over the last three decades. The apple production in China may be classified into the following four main production regions: The Bo Hai Wan Production region; the Northwest and Southwest highland region; the Yellow River and Qing mountain range area; and the Southwest cold highland area. Bo Hai Wan area is the biggest traditional apple production region, whilst the climate of the second region is the favourite for apple production with higher yields and a relatively large fruit (Thornsbury and Woods, 2007, p. 5).

Figure 2.2 Leading apple production countries (including cider apples) in the EU (1,000 t)



Source: EUROSTAT.

Table 2.9 presents the Top-10 apple provinces in China in 2007. Shandong, Shaanxi and Henan are the leading provinces for apple production in China. Fuji is the dominant variety whilst other common varieties include Delicious (*Yuanshuan*), Golden Deli (*Jinguan*), Jiaona Jin and Gala.

Area	Sown area (1,000ha)	Production Quantity (tonnes)	Yield/hectare (kg)
Shandong	304.9	7,249,227	23,775
Shaanxi	484.9	7,015,682	14,468
Henan	182.3	3,523,310	19,326
Hebei	250	2,478,845	9,915
Shanxi	144.3	1,872,681	12,977
Liaoning	107.1	1,514,781	14,143
Gangsu	247.6	1,424,253	5,752
Jiangsu	35.1	618,453	17,619
Anhui	13.3	403,627	30,347
Xinjiang	32.5	388,881	11,965

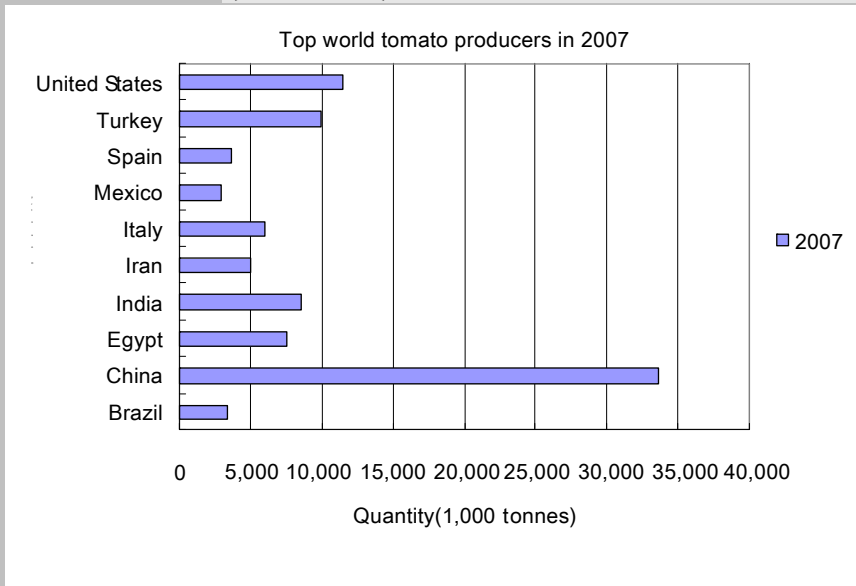
Source: Agricultural Statistics Summary (2007), Ministry of Agriculture, China.

2.3.2 Tomato production

In 2007 the world's total cultivated area under tomato was 4.6m ha, with a production quantity of 126m tonnes (Faostat). China is the world's leading tomato producer with a production of approximately 34m tonnes tomato in 2007. This volume is followed in quantity by the United States and Turkey. Figure 2.3 displays the top-10 tomato producing countries in the world in 2007.

Figure 2.3

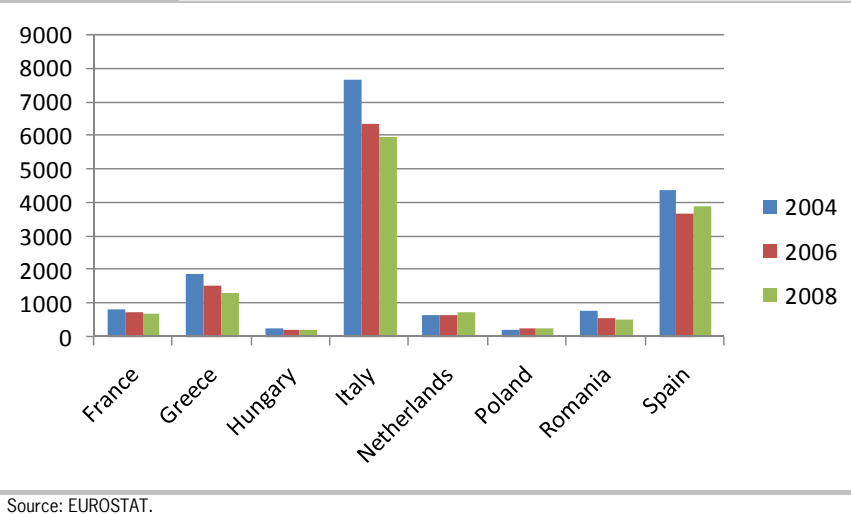
**Top -10 tomato production countries in the world
(1,000 tonnes)**



Source: FAOSTAT.

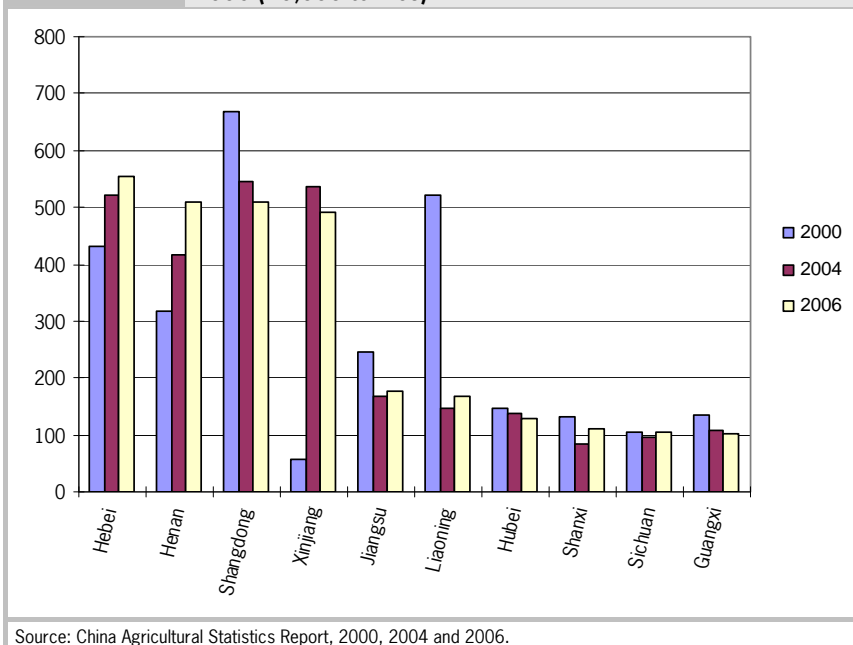
The EU tomato production stabilised to 21-23m tonnes over the last decade. In 2008 the three leading producing countries were Italy, Spain and Greece: they produced 5.98, 3.92 and 1.34m tonnes of tomatoes respectively. Figure 2.4 shows the main tomato producing countries in the EU.

Figure 2.4 **Leading tomato production countries in the EU**
(1,000 tonnes)



As a staple vegetable, tomatoes are produced in almost all provinces across China. The production capacity has continued to expand over the last decades. In 2006, the total tomato production reached 32m in China. Figure 2.5 illustrates the leading tomato production provinces in China, including Shandong, Hebei, Henan and Xinjiang. Note also that there are considerable structural changes for Xinjiang and Liaoning. In the year 2000, Xinjiang had a very limited tomato production. After the strategic discovery of the economic benefits, and public policy support at the beginning of 21st century, Xinjiang became the world's largest tomato processing centre. Liaoning, previously a traditional winter tomato supply region, lost its comparable advantage due to rising heating costs.

Figure 2.5 Main tomato production provinces in China from 2000 to 2006 (10,000 tonnes)



China is not only the world's largest fresh tomato producer, but also the world's largest tomato paste producer, followed by the EU and the United states. In 2008, the export quantity reached 818,512 tonnes, a sharp increase from 106,667 tonnes in the previous year. More detailed information about Chinese tomato paste markets is presented in Chapter 4.

2.3.3 Comparisons

Although the production quantity of tomatoes and apples in China has increased sharply in recent years, productivity is still low when compared with other countries. The tomato yield in a leading tomato producing country such as the Netherlands is nearly twenty-fold higher than that in China (4,451 vs. 231 tonnes per hectare in 2007), whilst apple yield in China is about one-third of that in France and the Netherlands (FAOSTAT).

2.4 Production costs of apples and tomatoes in the EU and China

2.4.1 Inputs of horticultural farms in the EU

The only source of micro-economic data that is harmonised in the EU is the Farm Accountancy Data Network (FADN). It consists of an annual survey from a sample of the agricultural holdings in the EU. The sample provides representative data along three dimensions: region, economic size and type of farming. Its results and other detailed information can be found at <http://ec.europa.eu/agriculture/rica/database/database.cfm>.

The FADN does not have the production cost data at crop level, but only the total input at farm level. The total inputs per farm consist of four parts: specific costs, overheads, depreciation value and external factors. Specific costs refer to crop-specific inputs, such as seeds, fertilisers, et cetera, whilst farming overheads include supply costs linked to production activity but not to specific lines of production. Total external factors refer to remuneration of input, mainly wages, rent and interest. Table 2.10 compares the total inputs of horticultural farms from four EU countries: France, Italy, the Netherlands and Poland. Of these countries, Dutch farms have the highest input and financial requirements, namely more than €1m per year, of which about 20% goes towards wages and social security charges. The Dutch farms also have higher overhead costs for the upkeep of modern equipment and heating fuel. In comparison, the total input for a Polish farm is relatively small, less than 5% of that of their Dutch counterparts.

Country	Total inputs	Total specific costs	Total farming overheads	Depreciation	Total external factors
France	217,616	61,075	70,626	25,829	60,085
Italy	78,616	33,540	15,384	10,126	19,566
Netherlands	1,017,032	272,694	358,998	132,133	253,206
Poland	44,866	17,272	14,921	6,664	6,009
			Bottom of form		

Source: FADN.

2.4.2 Production costs of apples and tomatoes in China

The Chinese government collects detailed data on production costs for its major commodities. Table 2.11 and Table 2.12 present the production costs of apples and tomatoes for major cities in China. The production costs are categorised as direct costs (material and input costs), indirect costs (depreciation, tax, marketing, et cetera) and labour costs (family and hired labour). As can be seen in Table 2.11, the production costs of apples production tripled between 2002 and 2007, reaching CNY2,175 per mu, an equivalent of CNY8,700 for an average of 4mu apple farm. The direct costs account for 62% of the total sum, whilst the labour costs are about 38% of the total costs. The production cost of tomato production under the greenhouse (Table 2.12) varies substantially across the regions in China. The cost in the northeast city Shenyang, the capital of Liaoning province, is the highest, reaching CNY5,539 per mu, or CNY83,085 per hectare, while the cost in the south city Wuhan is only CNY 2,659 per mu. This partly explains why in Figure 2.5 the tomato production in Liaoning dropped dramatically in recent years.

Table 2.11		Production costs of apples in China from 2002 to 2007 (CNY/mu)					
Item	2002	2003	2004	2005	2006	2007	
A) cost of goods and service	423	545	637	559	735	1,358	
a. Direct costs	330	459	587	533	698	1,263	
b. Indirect costs	93	86	50	26	37	95	
B) Labour costs	388	440	612	605	752	817	
Total Expenditure	811	985	1,249	1,164	1,487	2,175	

Source: National Development and Reform Commission (2008).

Item	Shijia zhuang	Sheng yang	Jinan	Zheng zhou	Wuhan	Urumqi
A) cost of goods and service	3,219	4,612	2,126	3,729	1,860	2,916
a. Direct costs	2,268	3,465	1,404	2,991	1,574	1,536
b. Indirect costs	951	1,147	722	738	286	1,380
B) Labour costs	1,968	927	1,541	1,450	799	1,259
Total Expenditure	5,187	5,539	3,667	5,179	2,659	4,175

Source: National Development and Reform Commission (2008).

Table 2.13 compares producers' prices of tomatoes and apples in China with other major countries in the world. The price in China is the highest and reached USD700 per tonne in 2007. The main driving forces behind these high apple prices are the appreciation of Chinese currency RMB, the rising energy prices and higher wage costs. At the other end, producers' prices of tomatoes in China were extremely low, less than one tenth of those in the Netherlands.

Varieties	USA	China	France	Netherlands	Spain
Tomato	761.00	125.74	941.35	1054.02	805.93
Apple	626.00	698.85	643.24	365.96	452.72

Source: FAOSTAT.

2.4.3 Comparisons

The average input of a horticultural farm in the EU is between €0.5m to €1m per year, whilst in China, it is less than €1,000 for an apple farm. Horticultural farms in the EU are relatively capital intensive. Labour accounts for 38% of Chinese apple production costs, which is higher than the average of 20% for labour costs in the horticultural farms in the Netherlands. Although rural China has a huge labour force, the labour costs are increasing rapidly due to migration towards the cities. The producers' prices for Chinese apples have reached international levels, whilst Chinese tomato producers' prices are still well below the international level. This implies that Chinese apples have a small comparative

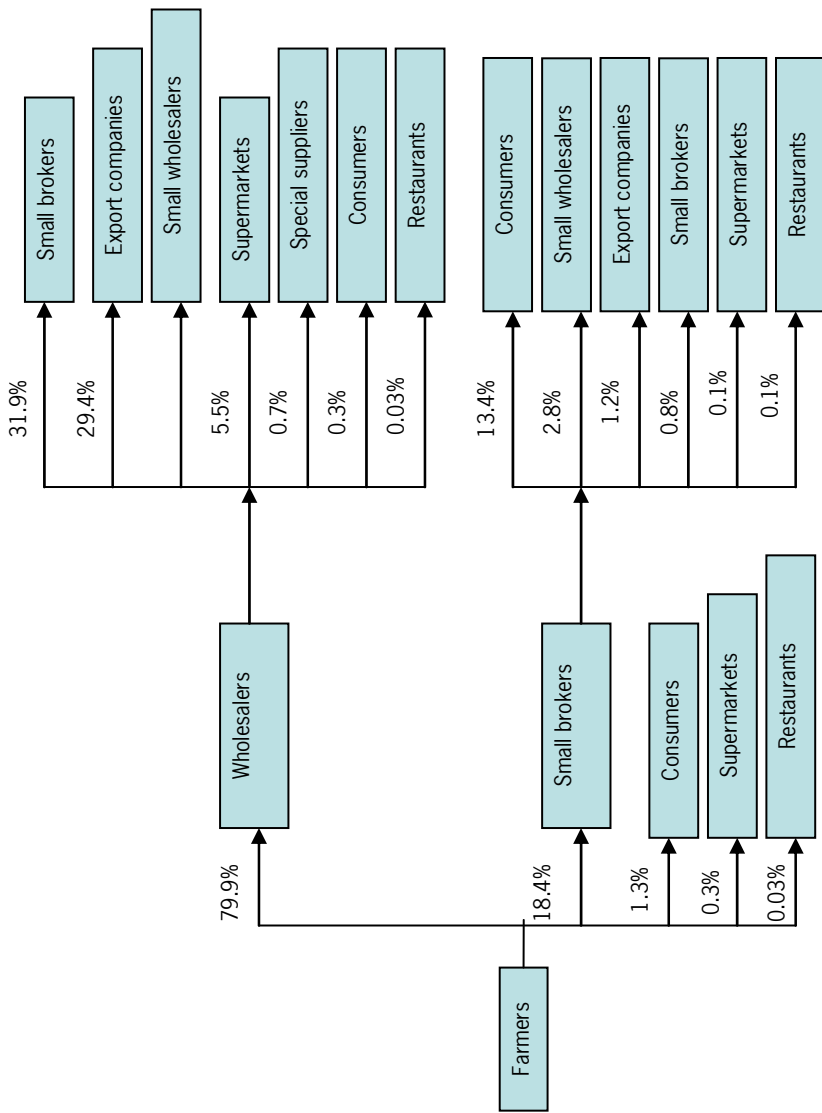
advantage on the international markets whilst the Chinese tomato processing industry is still expected to expand.

2.5 Marketing channels of the fresh fruit and vegetables in China and the EU

2.5.1 Marketing channels of the fresh fruit and vegetables in China

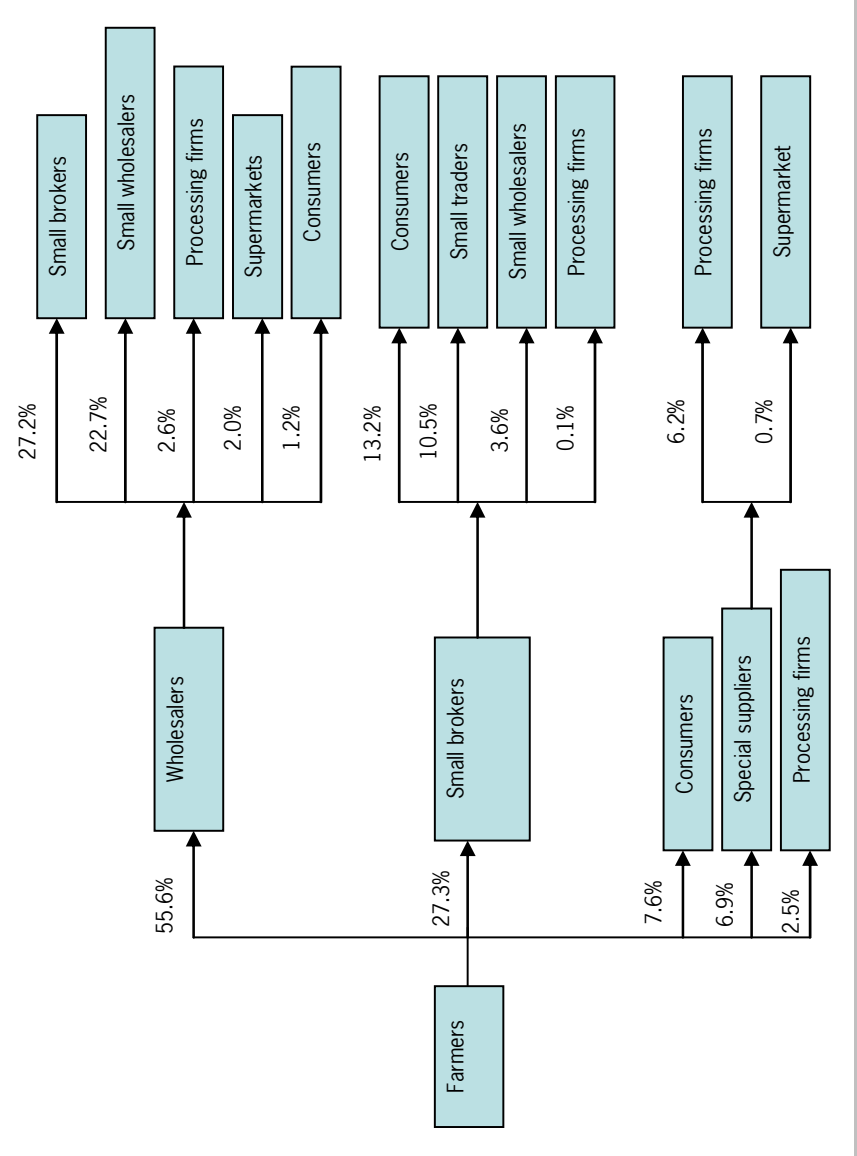
The fresh fruit and vegetable (FFV) distribution in China refers to the internal trade flows of produce between the provinces, since China's trade of FFV is very limited, reaching only an estimated 3% of its total produce. Moreover, wholesale markets in China still play an important role in the whole food distribution system. Figure 2.6 and Figure 2.7 present the apple and tomato market chains from the most important horticultural province Shandong, based on a survey carried out by Huang (2007 and 2006). Both channels indicate that wholesalers are the dominant players in the supply chain whilst supermarkets are still in the emerging stages.

Figure 2.6 Tomato market chain in Shandong in 2006



Source: Huang et al. (2007).

Figure 2.7 Apple market chain in Shandong in 2005



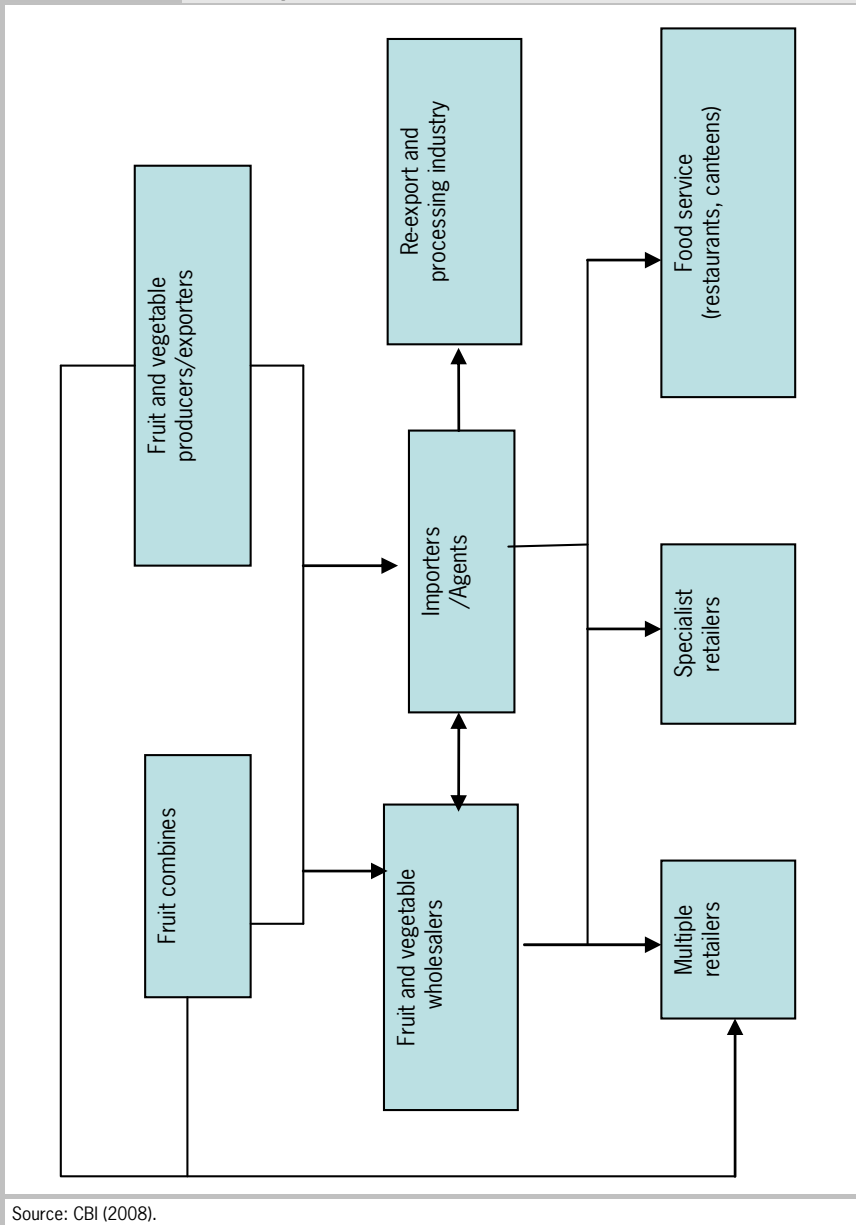
Source: Huang et al. (2006).

2.5.2 Marketing channels of fresh fruit and vegetables in the EU

The concentration of retail marketing is evidently strong in the supply chain of fresh fruit and vegetables in the EU. This is particularly the case in northern European countries where multiple retailers, mainly supermarkets and hypermarkets, play a dominant role in the retail markets. Figure 2.8 illustrates the distribution channels of the fresh fruit and vegetable trade in the European Union (CBI, 2008). At the production level, the market parties are fresh fruit and vegetable producers, exporters and fruit combines.¹ At the wholesale/import level, increasingly more importers and agents are getting involved in product quality control and logistical services. Due to large retailers' increased demands on uniform quality, volume and timely delivery, importers are increasingly providing their suppliers with advice on the issues of quality and safety. At the retail level, in addition to all variations of supermarket outlets, there are also specialist retailers, such as greengrocer shops, open air markets, farm sales and internet sales. Greengrocers still retain a substantial share in southern countries such as Italy and Spain, where the multiple retailers have not gained as much market dominance as in the northern countries.

¹ Most combines are based in North, Central and South America, having their own plantations and buying additional products from other producers when necessary.

Figure 2.8 Distribution channels of the fresh fruit and vegetables trade in the European Union



Source: CBI (2008).

2.5.3 Comparisons

The concentration of supermarkets at the retail level has strong implications for the whole food distribution system in the EU. It creates entry barriers for suppliers since only firms with sufficient resources can bear the costs and risks when dealing with large-volume supermarket groups. In response, the limited number of large suppliers work closely with their upstream wholesalers and producers on quality, quantity and safety issues required by the retailers. On the other side, the wholesale markets play a pivotal role in the distribution system of fruit and vegetables in China. The wholesale markets in China function as production gathering locations for producers and distribution centres for wholesalers. The role of supermarkets is still limited as a whole for the fruit and vegetables distribution in China.

2.6 Public policy for fruit and vegetables in China and the EU

2.6.1 China's Agricultural Policy in the last decade

The Chinese reform started with the so-called Household Responsibility System (HRS) in the rural economy in 1978. With regards to the vegetable and fruit sectors, it was only by 1984 that the central government started to liberalise its domestic markets and allowed free production and marketing. Since this HRS reform has already been widely documented, here the focus is more on the recent development of agricultural policy, referring in particular to policies that emerged over the last decade.

Abolishment of Agricultural Tax

In view of ensuring enough lands for staple crops such as rice and wheat, the government enforced a special tax for cash crops such as fruits and vegetables in the 1980s. Under this policy, fruit and vegetable farmers paid a much higher (12%) agricultural tax than the rice farmers (6%). In 2003, the central government abolished this special tax for cash crops and all farmers paid a non-discriminatory uniform tax rate. During the same fiscal year the central government started pilot trials to abolish the whole agricultural tax system in China. In 2006, all agricultural tax on farmers was finally brought to an end (Chen, 2009). This policy not only helps increase farmer's income in general, it also encourages farmers to specialise in higher-profit crops such as fruits. Meanwhile the

fruit production has also benefitted from the national environmental policy. Under this policy, rice and wheat production in the hilly and mountainous areas was set aside encouraging the planting of fruit trees or forestry trees to prevent soil erosion (Deng, 2005).

The New Era - Agricultural Subsidies

At the 16th National Congress of the Communist Party of China, the central government not only announced the abolishment of agricultural taxes, but also for the first time in Chinese history began to provide agricultural subsidies directly to farmers (Chen, 2009). The subsidy policy was outlined (and detailed) in the 2004 Number One Document of the Chinese government. This subsidy was limited to grain-related production at the initial stage, but later expanded to other subsectors also. The subsectors included the apple and tomato industry.

In 2003, the Ministry of Agriculture (MoA) released its first Plan for the Regional Layout of Competitive Agricultural Products (2003-2007), which provided guidelines for the development of selected agricultural products believed to have competitive advantage on the world markets. Apples are among one of those 11 chosen commodities¹ (OLGPS, 2008). In 2005, the MoA began providing subsidies for farmers in the regions of Bohai Bay and Yellow Plateau - targeted at apple bagging practices. Besides the subsidies from the central governments, most provincial and local governments also provide subsidies for apple production.

Similarly, in 2007, the MoA released its 11th Five-Year Plan for the Agricultural Products Processing Industry, which includes further developing China's tomato processing industry as a priority (USDA, 2008). This plan identified Xinjiang, Inner Mongolia, Gansu and Ningxia as the best suited growing areas for tomatoes intended for tomato paste production.

2.6.2 Reform of the Common Market Organisation for fruit and vegetables in the EU

Since fruit and vegetables both come under the Common Market Organisation, the EU policy on the Common Market Organisation's reform is relevant. We thus

¹ Eleven categories of chosen products: wheat and maize of specific end-use, high-oil soybean, cotton, double-low rapeseed, high-yield and high-sucrose sugarcane, citrus, apple, beef cattle, mutton sheep, milk and aquatic products.

cite in this section the details of the reform as it was announced at the European Commission's official website http://ec.europa.eu/agriculture/capreform/fruitveg/index_en.htm

Box 2.1

**Objectives of the reform of the Common Market
Organisation for Fruit and Vegetables in the EU**

A new Common Market Organisation for fruit and vegetables, together with a fresh set of implementing rules, is in place as from 1 January 2008. The aim of the reformed CMO is to improve the competitiveness and market orientation of the fruit and vegetable sector, to reduce income fluctuations resulting from crises, to promote consumption - so contributing to improved public health - and to enhance environmental safeguards. New measures have been taken to encourage growers to join Producer Organisations. POs are offered a wider range of tools for crisis management; the fruit and vegetable sector is integrated into the Single Payment Scheme; a minimum level of environmental spending is required; EU funding for promotion and organic production is increased; and export subsidies for fruit and vegetables are abolished.

- *Producer Organisations (POs)*
POs will gain greater flexibility and their rules will be simplified. There will be additional support (60% Community co-financing rather than of 50%) in areas where production covered by POs is less than 20%, and, in particular, in the new Member States, to encourage the creation of POs. Member States and POs will develop Operational Programs based on a national strategy.
- *Crisis Management*
This will be organised through Producer Organisations (50% financed by the Community budget). Tools will include green harvesting/non-harvesting, promotion and communication tools in times of crisis, training, harvest insurance, help in securing bank loans and financing of the administrative costs of setting up mutual funds.
- *Inclusion of fruit and vegetables in the Single Payment Scheme (SPS)*
Land covered by fruit and vegetables will become eligible for payment entitlements under the decoupled aid scheme which applies to other farm sectors. All existing support for processed fruit and vegetables will be decoupled and the national budgetary ceilings for the SPS will be increased. The total amount that will be transferred to the SPS is around €800m. For tomatoes, Member States will be allowed to apply transitional payments for a four-year transitional period (2008-2011), provided that the coupled pro-

portion of the payment does not exceed 50% of the national ceiling. For non-annual crops, they will be allowed to apply transitional payments for 5 years, provided that after 31 December 2010, the coupled proportion does not exceed 75% of the national ceiling. Member States may if they so choose postpone the distribution of fruit and vegetable entitlements for up to 3 years.

- *Environmental measures*
The inclusion of fruit and vegetables in the SPS means that Cross Compliance (i.e. mandatory environmental standards) will be compulsory for those farmers receiving direct payments. In addition, POs must devote at least 10% of expenditure in each Operational Programme to environmental measures. There will be a 60% Community co-financing rate for organic production in each Operational Programme.
- *Encouraging greater consumption*
Higher consumption of fruit and vegetables was one of the goals identified in the Commission's White Paper on Nutrition, published in May. POs will be able to include promotion of fruit and vegetable consumption in their operational programmes.
- *Transitional soft fruit payment*
To allow producers of strawberries and raspberries for processing to adapt to market circumstances, they will receive a transitional direct payment worth €230/ha for a maximum period of 5 years for a set number of hectares. Member states may pay a national top-up so that the total shall not exceed €400/ha.
- *Separate fruit and vegetable payment for SAPS countries*
Countries applying the Single Area Payment Scheme will be able to introduce a decoupled fruit and vegetable payment to historical producers of fruit and vegetables. They will have to decide by 1 November 2007 the amount to be deducted from the SAPS envelope to cover this and the criteria used for the allocation of the fruit and vegetable payment.

2.6.3 Comparison

Both China and the EU are providing subsidies to their agricultural sector. The subsidy policy in China is around 5 years old, whilst agricultural subsidies in the EU can be traced back more than five decades. Furthermore, the agricultural subsidies in China are still in a trial phase for selected crops or activities, whilst the EU policy is much more comprehensive and is moving away from market support to direct income support. Furthermore, the EU policy covers a

much broader dimension, such as subsidies linking up with environmental safeguards as well as consumption promotion. Both in China and in EU, fruit and vegetables receive relatively less governmental support when compared with other crops such as cereals.

3 Linking small-scale farmers in China with the international markets: the apple export chain case¹

3.1 The enabling environment

The Chinese economic reform started with an institutional change called the 'Household Responsibility System (HRS)'. This started in the early 1980s. It tore down the commune-based production system and restored individual household units as the primary production framework (Lin, J.Y., 1987 and 1988). The first impact of this reform was felt by the apple industry of Shandong in 1984. That year, collective apple orchards were distributed to individual households and each became responsible for its own apple production. In the same year, the marketing of apples was also liberalised. The government no longer imposed price control, and private traders were allowed to enter or leave the apple market without restriction or outside control. At the time apples were a luxury product in China with high prices and limited supply. Consequently, farmers planted additional apple trees during that period. Qixia, the most famous apple growing region in China, doubled the size of apple orchards in 1984. This expansion was encouraged by the Chinese Ministry of Agriculture (MoA), which defined Qixia as one of the Quality Apple Production Bases, and provided CNY2m in subsidies for the purchase of young apple trees and additional incentives.

China's entry into the World Trade Organisation (WTO) in 2001 was another significant event for the apple industry. By this time the apple trees planted in the middle of 1980s and early 1990s were in full production. Chinese apple markets were no longer in short supply and new markets were required to keep the price of apples up. The potential for increased trade provided an incentive for seeking out these markets.

¹ This chapter was based on the publication by X. Zhang, H. Qiu and Z. Huang, 'Linking Small Scale Farmers in China with the International Markets: A Case of Apple Export Chains'. In: *International Food and Agribusiness Management Review*, Volume 12, Issue 3, 2009.

Another change in 2001 that had a major impact on the apple industry was the introduction of the pollution-free Food Action Plan by the Chinese government. This was instituted to address the demand for safe food and quality that were increasingly required by both domestic and international markets. The main objective of this plan was to establish a sound food quality and safety standard system in China within ten years. To promote the apple quality, and particularly to reduce the pollution due to pesticide use, apple production in Qixia, the main apple region in Shandong province, was now required to shift towards producing safe food by adopting pest lighting, by promoting the use of organic fertilisers, and by minimising the use of chemical pesticides. Under the plan, the Ministry of Agriculture (MoA) certified most apple production regions in Shandong as 'Pollution-free Apple Demonstration Base'. Qixia's achievement in environmental protection was recognised in 2002 when the National Bureau of Environmental Protection classified Qixia as a National Ecological Demonstration Zone.¹ As an Ecological Demonstration Zone, apple farmers in this area were required to reduce substantially their use of chemical fertiliser and pesticides, and to increase the use of organic fertiliser and biological methods to control disease and insects. Apple farmers now had an incentive to join this action because they were able to obtain higher apple prices by labelling their apples as being produced within the 'National Ecological Demonstration Zone.' In 2005 the first export company in Qixia achieved EurepGAP certification, enabling it to export to the EU. Since then, more companies were certified, in part because of encouragement from 2006 onwards by the provincial department of Finance in Shandong which provided subsidies equal to 40% of the cost of EurepGAP - the total cost of certification was CNY20,000 of the CNY50,000. Some county governments provided additional subsidies to companies. By 2008 most export-oriented companies in Qixia had obtained EurepGAP certificates.

¹ In order to promote the building of ecologically sound cities, starting from 1995, the Chinese Ministry of Environmental Protection had examined and approved the construction of 528 pilot sites and units of ecological demonstration zone in 9 batches, and the number of designated state level ecological demonstration zones had reached 233.

3.2 Apple Chain Analysis

3.2.1 Farm Structure

Qixia, the leading apple export region in Shandong, China, will be used as a case in this section to illustrate how small the production scale of Chinese apple farmers is and, in the next section, to illustrate how innovative Qixia farmers are.

For more than a century apples have been produced in Qixia, which produces top quality apples on its hilly and mountainous landscape complemented by its suitable soil and weather conditions. Prior to the market liberalisation in 1983, Qixia had 7,360ha of orchards producing 99,200 tonnes of apples. By 2007, Qixia's apple orchards covered 43,300ha and produced 8m tonnes of apples.

Interviews with the local government and farmers showed that most apple orchards of individual household in Qixia ranged in size from 0.15 to 0.65ha. The large scale farmers with plots larger than 0.65ha accounted for 20% of the total production. These farmers had increased their production by renting additional hilly land from their village committees, or sub-renting land from other farmers. The middle-scale farmers had with plots averaging 0.4ha and accounted for 60% of the total production. The smallscale farmers with plots of 0.15-0.2ha produce the remaining 20%. Even the so-called large orchards in China were smaller than 1ha, which was very small in scale in comparison with orchards in other apple producing regions around the world.

Apple cultivation was more profitable than wheat and maize production in Shandong. For example, in 2006, the net profit for producing wheat, maize and apples per hectare of land in Shandong was CNY2,010, CNY2,460, and CNY3,670, respectively (NDRC, 2007). Hence, apple farmers invested heavily in apple production, including investments in transportation machinery (tractors) and irrigation and spraying equipment. They also endeavoured to improve the soil quality by applying more organic matter such as soya cakes, believing that good soil improved both the taste of and the productivity of the apple trees. The government's recent programme 'to adapt fertiliser application to soil conditions' also encouraged soil improvement efforts.

3.2.2 Technology Innovation

Technology innovation played an important role in the development of the apple industry in Shandong. This can be seen by noting that Qixia farmers were inno-

vative in the adoption of new apple varieties. In 1984, there were more than 60 apple varieties in Qixia, of which the most popular were *Xiao Guo Guang* (46%) and *Green Banana* (11.3%). Since then, the Fuji apples from Japan were introduced along with other shorter branch varieties. In the 1990s R&D researchers in

Yantai (the region to which Qixia belongs) successfully introduced a series of Fuji-based varieties, such as Fuji2001, YanFu No. 1 and No. 3. These varieties were produced by cross-breeding Japanese Fuji with local varieties. By the end of 2007, the leading variety was the Fuji series (80%), followed by Gala (11%) and New Red Star (6%).

Cultivation innovation is another success factor for Qixia's apple industry. In 1990, a special pruning technique aimed at stimulating flowering was adopted. This was later adapted in the rest of China. In 1993, experiments with the bagging of apples started. The paper bags greatly improved the quality, colour, and surface shine of the apples, and reduced pesticide pollution content in the fruit. This labour intensive technology was formally adopted in 1996 in Qixia and has since reached an acceptance rate of 95% in Qixia.

In addition, improvement in storage facilities contributed substantially to providing high quality apples year-round. In 1984, there were only three cold storage facilities with a total capacity of less than 10,000 tonnes. By 2006, there were more than 200 cold storage facilities with a total capacity of 360,000 tonnes. Some of these facilities used highly advanced atmosphere control systems.

3.2.3 International and domestic market

The main international markets for Chinese apples were South East Asia (Indonesia, Philippines, Singapore, Thailand) and the EU (Spain, France, NL and UK), where the EurepGAP certificate was required (recently renamed as GlobalGAP). In the UK the quality requirement (hardness and sugar contents) was higher than on the European continent. Chinese apples did not have access to the Japanese and the US markets due to phytosanitary restrictions. Chinese exporters indicated that the strictest apple export market in terms of phytosanitary requirements was Canada.

China was influencing international apple market prices because it was such a large producer. Fewer apples entered international trade when supply was closer to domestic demand and more apples entered foreign markets when

supply was larger than domestic demand. Consequently, international traders watched the Chinese markets closely.

Typically Chinese apples were cheaper than those of other countries. However, this was not the case in the harvest year 2007-2008 for several reasons: the appreciation of the Chinese yuan against the US dollar by 15% within a year, an increase in the apple procurement price at farm gate by 20-30%, plus a 10% increase in packing material costs (such as paper and plastics). These led to Chinese apple prices almost equalling US prices in the South East Asian markets in 2007. Some Chinese exporters retreated from the EU markets as they lost price competitiveness. Meanwhile, they found that India was a promising market for top quality Chinese Fuji apples and consumers there were willing to pay premium prices for high quality apples.

Export-oriented traders started selling apples in the Chinese domestic market in 2007 after retreating from international markets. To their surprise, they discovered that domestic markets were quite profitable, particularly for quality apples. It seems that the domestic prices are more responsive to the product's quality than the EU markets. The main destinations in domestic markets are supermarket chains and wholesale markets in Guangdong, Fujian, Shanghai and Beijing.

Domestic markets for apples function similarly to other horticultural commodity markets in China. In the 1980s and 1990s, many smallscale vendors collected apples in villages. More recently, the collectors increased their scale and used larger transport trucks. Farmers started to choose collectors with a good reputation, in particular those who paid on time. Most farmers were still engaged in spot markets.

3.2.4 Non-tariff measures

The EU applied an 8% tariff from August through May and no tariff from April through July. The EU also had numerous other requirements. All exporters had to register their companies and their production bases (the location of the apple orchard is one example). In addition there were specific package requirements. All wooden pallets had to be steamed for more than 45 minutes at a temperature higher than 60 degrees Celsius. Thus the local China Entry-Exit Inspection and Quarantine Services (CIQ) required all facilities packaging apples for export be registered and have video cameras installed so that the local CIQ could monitor and check the steam process via the internet. And paper boxes had to

be glued, not stapled. Apples that varied more than 10% from the desired apple shape were rejected.

Some Chinese exporters described customs problems entering markets in North and South America. One incident occurred in 2006 when Mexican customs did not allow three containers from Shandong to pass through because of alleged quality controls deviations. Shipping these apples back to China was economically unviable, so they were destroyed near the harbour. The Chinese exporter claimed to have received only a vague explanation about the quality problem.

In 2008 Chinese apples could not enter the US or Japan. China had been negotiating the entry of fresh apples into the US since 1998. The Animal and Plant Health Inspection Service of the US Department of Agriculture had sent a list of over 300 concerns to the quarantine inspection agency of the Chinese government in 2003 and the Chinese government responded the next year. In 2008, the negotiations were still taking place.

3.2.5 Price formulation and price transmission

3.2.5.1 Price formulation

In normal production years, the early harvest which began in October saw a peak price peak of around CNY6 per kg. This was due to apple traders and storage owners purchasing the best apples. The prices dropped to around CNY5.4 per kg during the following few months until the second peak around the Chinese new year (end of January or beginning of February) when the price level increased to about for more than a century CNY6.4 per kg (apple demand increases substantially in this period). In spring, the prices would fall slightly and then peak again in June/July at the level of CNY7 per kg. The last price peak occurs when the supply of apples in cold storages begins to diminish due to physical reasons, and consequently us apples stored at high cost in air-controlled systems enter the market. Apple prices in China fluctuated considerably in recent years, however. Every farmer and trader in China remembered the 'dark' year of 2005 when the procurement prices at farm gate reached their lowest point CNY1.20 (USD0.15) per kg, as opposed to a good year like 2007 when the prices reached CNY5.6 (USD0.74) per kg.

The cost composition of the prices at different stages of the apple chains are as follows. Table 3.1 shows the price and costs of apples at farm level. Ta-

ble 3.2 shows the price and costs of apples at collectors' level. And Tables 3.3 and 3.4 show the price and costs of apples at exporters' level.

Table 3.1 Apple prices and costs at farm level in CNY per hectare in 2007		
Items	Costs and values a)	Note
a. Fertiliser	12,000	
b. Pesticides	9,000	
c. Bags	15,000	
d. Irrigation	3,000	
e. Labour cost	42,000	Of which 15,000 for hired labour
f. Total cost (a + b + c + d + e)	81,000	
g. Harvest	3,000 kg, average CNY2,6 per kg	
h. Total revenue (g * 2.6)	117,000	
i. Profit per hectare (h - f)	36,000	

a) €1 equalled around CNY10 in 2007.
Source: Field interviews (July 2008).

Table 3.2 Apple prices and costs at collectors' level in CNY per kilogram in 2007		
Items	Costs and values	Notes
a. Procurement price at farm gate	4.00	Grade 2 and grade 3 mixed
b. Costs of web netting, grading and uploading	0.40	If using paper carton, adding another CNY0.30
c. Costs of transportation to storage facilities	0.06	Within 50 km
d. Storage cost	0.40	Until end of may next year
e. Total added costs (a + b + c + d)	4.86	
f. Sale Prices	5.4	
g. Profit margin (f - e)	0.54	

Source: Field interviews (July 2008).

Items	Percentage
Apple procurement	75
Labour	4
Customs/inland transportation	3
Pack material	10
Overhead	8
Total	100

Source: Field Interviews (July 2008).

Stages of the chain	Added value (CNY)	Market functions	Price formulation	Price accumulation (in %)
Farm	4	Production	4	20
Local collection	0,42	Sorting, grading, web netting, transportation	4,42	2
Storage	0,80	Cold storage, out sorting, loss	5,22	4
Export, leaving from Qingdao harbour	1,03	Inland transport, inspection, customs fee	6,25 (FOB price)	5.2
Arriving at Rotterdam harbour	0,45	Sea fare, insurance	6,7 (CIF price)	2
Import	1,77	Customs cleaning, tariff	9,47	8.9
Wholesale	0,98	Storage cost, profit margin	10,45 (wholesale price in EU)	4.9
Retailing	9,55	Transport, loss, profit margin	20	47.75

Source: Field interviews (July 2008).

The precise values for these items vary considerably across the growing seasons and regions. However, the data in the tables indicate the value distribution along the chain in addition to input-output analysis at firm level. While

China's apple market chain is very competitive, farmers have received much larger price margins (20% over what consumers pay at the supermarkets) compared with small farmers in other countries. For example, Doland et al. (1999 and 2001) presented a detailed cost structure for African FFV export to the UK. Their results indicated that producer costs only account for 12% and 14% of the final prices for Zimbabwe and Kenya, respectively. In keeping with their study, this research also found the greatest margins in the final stages of the chain, or supermarkets.

3.2.5.2 Price transmission

Compared with 5 years ago, apple prices were transmitted incredibly quickly in Shandong. According to interviews, during the 2007 harvest season, Shandong farmers followed price changes at wholesale markets within their cities instantly using mobile phone and telephone. Price change information in the markets outside of their province, such as in Guangdong's wholesale markets nearly 2,000km away from Qixia, were transmitted to apple farmers in Qixia within two days. Based on this price information and their own storage capacities, traders adjusted their procurement prices and quality requirements and informed local collectors of their prices (lower or higher) a day earlier. Local collectors also formulated their own judgments on price changes based on the degree of urgency from traders' buying orders.

Traders indicated that international price changes were transmitted immediately between China and international markets since most Chinese exporters had daily contact with their foreign importers. Even small traders in China knew of price changes in the international market within one week. This meant that Chinese exports were subject to volatility as exporters altered prices in order to stay competitive.

One's understanding of the volatility in prices is conditioned by one's exposure to the markets. Most apple farmers usually sell apples to traders/collectors within 40 days of harvest because they do not have storage facilities. This means they have a limited period in which they can respond to price signals. Only a small proportion of farmers rent storage facilities and so can market their apples throughout the year. In most cases, traders bear the market risks after the harvest season is over.

Their different perspectives meant that they had a different understanding of events and hence what prices would be. In the 2006-2007 production year there was bad weather (frost) in some apple production regions in China, and

traders were speculating that Chinese apple production would decrease in 2007. Hence, during the harvest season, traders and collectors were in competition to procure and store as many apples as possible. The prices traders paid farmers in 2007 were very high and farmers made large profits. Consequently in 2008 farmers expected good prices so attempted to improve both apple quality and quantity. However, traders had a different story. Their profits in 2008 were smaller because of the high prices they paid for apples in 2007 and the appreciation of CNY. Consequently they were looking at paying less for apples.

All farmers at the focus group discussions agreed that prices were not transmitted to them systematically. When the apple prices at the urban markets were higher, their farmgate prices were higher, but to a lesser extent. When the urban prices were lower, farmgate prices were much lower than the changes in the urban market. Farmers based this view of price on 40 days of price fluctuation following the harvest. After that period it was the traders who experienced the market price volatility. So, it was the exporters rather than the farmers who bore most of the price risks on the apple markets.

3.2.6 Consumer preferences

Fuji apples had a sweet taste, but more importantly their appealing red colour was highly valued, particularly in Asian countries. In 2007 the Chinese consumed 80% of grade 1 Fuji apples while most exported apples were grade 2 and grade 3. Although premium apples were more expensive, the growing middle class in provinces such as Guangdong and Fujian were willing to pay for these apples.

Generally speaking, in northern China, consumers prefer big apples while in the southern part of China they like smaller apples, and Shanghai consumers often choose middle sized ones.

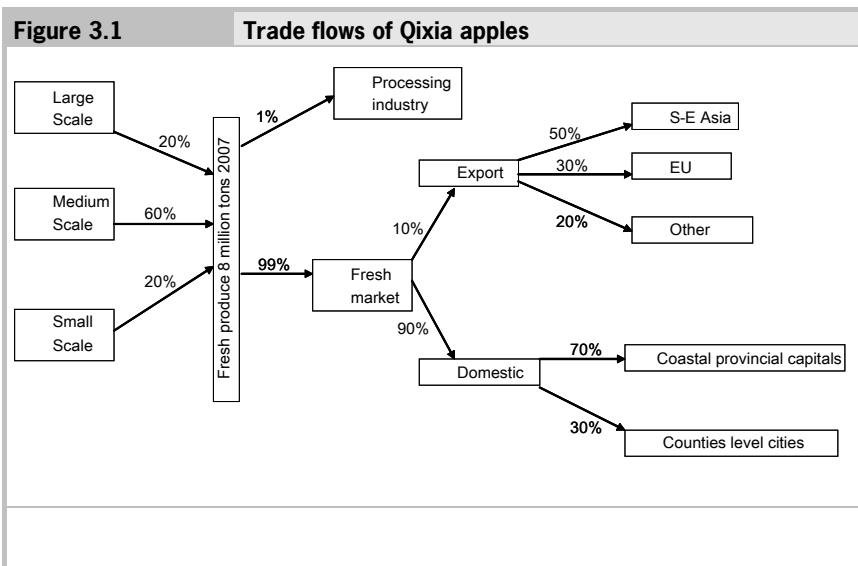
India is becoming one of the most important markets for Chinese apples as Indian consumers willingly paid for top quality, heavy red Fuji apples even though the Indian tariff on imports was raised from 40% to 80% in 2006.

In the EU markets, Spanish and French consumers also relished Fuji apples. Chinese traders reported, however, that EU consumers chose grade 2 apples since they have the same taste as grade 1 though they were less appealing colour-wise.

3.3 Mapping supply chains and institutions

3.3.1 Mapping supply chains

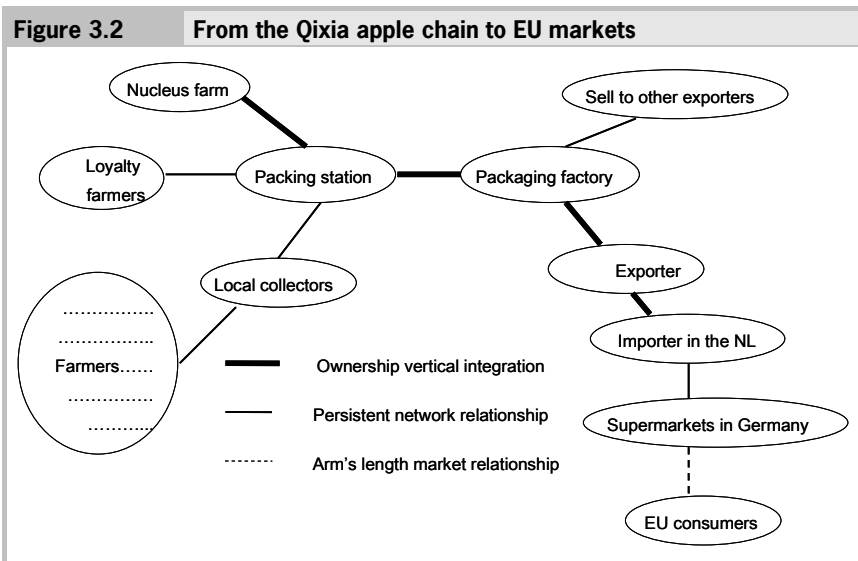
Here again we use Qixia as a case to illustrate the apple trade flow in Shandong. Qixia had 43,000ha of apple orchards in 2007 and produced 8m tonnes of fresh apples (SBSP, 2008). Around 10% was exported to Southeast Asia, the EU and Russia, while the rest was earmarked for domestic consumption. The top quality apples went to big provincial cities, such as Guangzhou and Xiamen, while apples of lower quality went to cities in the counties. The Qixia apple flow chart and the percentages of the products marketed through different channels are shown in Figure 3.1. It shows that the greatest tonnage of the apples (60%) is produced on the medium-scale farms. A very small part of Qixia 's tonnage went to the processing industry. Although Qixia is the main apple exporting region in China, the largest portion of the tonnage of (90%) supplied the domestic markets.



There are various apple supply chains in Shandong. A supply chain picture of one export company actively involved in the EU market is illustrated in Figure 3.2. The apple production in this chain was mainly carried out by its long-

term loyal farmers as well as by farmers connected through local collectors. These farmers were part of a cohesive area entity - their smallholdings were individually owned yet geographically connected to one another.

The marketing function of the packing station was sorting and grading. Packaging materials, such as boxes and pallets, were produced in its own packaging factory. Exporters extended their control over various stages of the chain by owning a nucleus farm, a packing station and a packing material factory. Since both Chinese government and EU regulations required that apple exporters register their orchards and packaging factories, it was efficient to centralise all of these processes. In addition to upward integration by the exporter, it also coordinated downward along the chain by setting up a joint venture with its long-term EU trading partner. This was a highly coordinated apple supply chain where all chain players were either vertically integrated or shared persistent network relationships, with the exception of consumers at the end of the chain, where a simple market relationship applied.



3.3.2 Mapping institutions

A wide range of public and private institutions affected apple chains. Institutions which were critical to each phase of the apple export chains are identified in Table 6. Highlights are as follows:

- At the production stage, land tenure was the central issue. When collective land was equally distributed among villagers in the 1980s, land tenure was guaranteed for 30 years. Due to decent income from apple production and the exemption of governmental land taxes since 2003, capable farmers were requesting more land;
- Farmer cooperatives were allowed to be involved in apple production under the newly adopted Cooperative Laws;
- The China Entry-Exit Inspection and Quarantine Services (CIQ) at local level frequently inspected fields and orchards;
- In some cases importing markets required that private institutions be involved in apple production, such as EurepGAP when apples were to enter the EU markets;
- Packaging materials were produced in factories certificated by the CIQ to guarantee food safety and meet phytosanitary requirements;
- Workers at the factories enjoyed certain welfare and working conditions according to new Labour Law requirements in China;
- Some traders were considering applying for certificates in corporate social responsibility as encouraged by importers;
- Quality control schemes, such as HACCP, were also prevalent;
- All export companies and their orchards were registered and checked by the local CIQ in China, except for those exporting to Canada. The companies were registered at provincial CIQ level, an indication of a more demanding requirement. When apples are ready for export, CIQ tested a sample of every shipment. Customs checked the consistence between the customs paperwork and the products;
- Both the EU and China had clear standard set for apple grades to ensure quality. Most traders, however, had their own private standards which were stricter than compulsory standards;
- Food safety laws protected consumers' health;
- Preferences of consumers around the world varied and these differences were often difficult to address.

	Production	Packaging	Trade	Consumption
Public Institutions	Cooperative Law	Labour Law	Customs	Food Safety Laws
	Land Tenure	CIQ	CIQ	
	CIQ		WTO and Bilateral agreement	
			Compulsory standards	
Private Institutions	EurepGAP/ GlobalGAP	Social Corporate Responsibility	Private standards	Cultural preference
		HACCP		

3.4 Chain governance mechanism

We use the term 'chain governance' to denote the ways in which activities along the chain are coordinated, such as how the process is specified and how standards are enforced and monitored. Since the linkage between smallscale farmers and modern traders was the bottleneck for the apple chains, we were particularly interested in how small-scale farmers were integrated in the apple export chain so we will describe this in greater detail than governance relationships in the rest of the chain.

Export companies were the leading firms in the apple export chain and used their power structure in the apple chains. Five modes of relationships with farmers were identified using the interview data. Each is now described separately.

Mode 1. Multi-party networks

Exporters signed agreements with village committees to support apple production in the village and purchase quality apples from village farmers. There were no prescribed agreements on apple prices and quantities. In order to help improve the apple quality exporters hired technical consultants from township extension stations to advise villagers with pesticide and chemical uses. About 5 to 10 times a year these consultants offered apple farmers field management courses. Exporters procured top quality apples by offering higher prices than the prices offered by other collectors. Exporters selected the villages based on the scale of the village orchards, purity of varieties, taste and quality of apple, and open transparent communication relationships with the village committees.

Mode 2. Preferred farmers

Exporters developed long-term relationships with preferred farmers by continual cooperation over time. Exporters could have hundreds of preferred farmers. These farmers were selected based on mutual trust as well as geographic location: higher altitude regions with tasty apples were preferred. Exporters required that these farmers use particular fertiliser and chemicals. In the end, exporters paid preferred farmers a higher price than the market price.

Mode 3. Nucleus farm

Exporters often owned nucleus farms where they could demonstrate agronomic practices and provide training. A nucleus farm could be formed in several ways:

- (1) Export companies could lease collective orchard land from village committees where suitable soil and irrigation ensured quality apples;
- (2) The companies could acquire land from individual farmers by signing land tenure agreements with village committees. Exporters then employed village farmers to work on orchards (paid by salaries) and paid the village land rents annually (the village will then pay farmers); or
- (3) Exporters could lease land directly from farmers to establish their own orchards.

Mode 4. Cooperatives

Exporters would jointly register with farmers that they trusted as cooperatives. This was a step further than simply working with preferred farmers. The exporters joined the co-ops based on the value of their cold storages and marketing capacity while the farmers join the co-ops based on their apple production. The farmers chosen had good reputations (that is, they were cooperative in terms of applying fertiliser and pesticide) and operated adjacent orchards. The farmers delivered their graded apples to exporters' cold storage without determining prices. The sale committees in consultation with farmers sold these apples in the markets. The exporters' storage and marketing costs were deducted from the apple revenues and the remaining funds were then distributed among farmers. The cooperatives also hired technicians to provide technological support to its farmers and help procure inputs so that the apple quality was constant.

Mode 5. Contracting for special markets

Written contracts were rarely used though informal contacts started when the exporter began advising farmers that they follow certain production practices. The survey only identified one case when a written contract was used. That time

an importer had a special requirement for yellow-green Fuji apples rather than the normal red apples. The exporter signed detailed contracts with farmers one month before the harvest in which the quality, quantity, colour and prices of apples was specified.

The governance relationships between apple farmers and their exporters under five modes are compared in Table 3.6. The comparison is in terms of their objectives, the co-ordination mechanism and the institutional environments. The first mode, the co-ordination of the multi-party mode, was based on a wide network of exporters, village committees, farmers and extension staff. Through this network, exporters treated farmers' land as their 'orchards' and influenced farmers' production process in order to obtain a higher volume of top grade apples. The second mode, the preferred farmers' scheme, was the result of mutual trust-based relationships between farmers and exporters. The third mode, the exporters' owned nucleus farm, served two purposes: to demonstrate practices to other farmers; and to satisfy export regulations which require orchard registration. The fourth mode, the formation of a cooperative by an exporter and farmers was done to maximise chain performance in both profitability and product quality. And the fifth mode, written contracts, was only used when the exporter desired a specific product. In the apple-sourcing sector relational network based on trust and reputation was far more important than formal contracting.

Modes	Objectives	Chain Co-ordinations	Institutional Environments
1. Multi-party network	Getting more top grade product	Network based	Land tenure
2. Preferred farmers	Stable quality suppliers	Persistent relationship	Trust
3. Nucleus farm	Demonstration	Integration	Corporate law
4. Cooperatives	Efficient chain performance	Equity-based	Cooperative law
5. Contracting	Specific demand	Specification contracts	Contracting law

The dominant way in which exporters sourced their apples was through local collectors or agents. These delivered more than half of the exporters' apples.

Some big exporters used up to 400 collectors. These collectors were entrepreneurial farmers as well as private businessmen. The relationships between collectors and farmers changed over time. Five years ago farmers had to ask collectors to accept their apples. More recently, collectors encouraged farmers to deliver apples to them by providing more help and support to farmers as well as high prices. Farmers felt that it was getting easier to sell apples than a few years ago. The main reason was a strong demand for quality apples.

Farmers were very conscious about collectors' reputations. They did not do business with collectors who had a poor reputation ('no heart' in the farmers' words). The main measures of reputations were quality requirements, fair pricing, honest weighting, and timely payment. Most farmers believed contracts were useless without trust because enforcing contracts through lawsuits was too costly. In addition, collectors and traders also thought that contracts without mutual trusts were useless because it was hard to sue collective, small farmers.

3.5 Conclusions and policy implications

This paper has analysed the Chinese apple chain from a global supply-chain perspective. Over the last 20 years, the Chinese apple industry has made great progress in terms of both quantity and quality. China has emerged as one of the leading players in the global apple market over the last two decades. As described in this study, the Chinese apple export chains had become highly integrated within the international market. The efficient price transmissions between China and the world markets indicated a high degree of market integration. In addition, farmers were well integrated into apple chains and received a much higher profit margin compared with apple farmers in most other countries.

The success of the Chinese apple chain was attributed to factors such as technology innovation and market liberalisation. However, we would like to focus on two policy observations from our Chinese experiences. These observations may provide other transitional countries struggling with their global chain structure with ideas they may like to consider during the process of economic global integration.

The first observation is that globalisation is beneficial to improving food safety and quality in China. A review of the development of apple industries in China over the last three decades shows that the process of domestic market liberalisation and integration into world markets has had a substantial impact. In the 1980s, apple production started to take off as a result of domestic market

liberalisation. Towards the end of the 1990s apple markets changed from supply driven to demand focused when food safety and quality became priorities due to well-off domestic consumers and pressures from trade partners. After China joined the WTO in 2001, Chinese apples quickly became significant in world markets because of their good quality and low prices. Meanwhile, domestic consumption increased as a result of the increasingly affluent middle class in China.

The development of China's apple industry showed a clear path that began with increasing production, then pursuing quality and safety, followed by entering international markets, and then returning to domestic markets. During this process globalisation was not the goal but was used as an instrument to improve the product's quality and safety. As the domestic markets mature, traders may alternate between domestic and international markets, depending on profitability at the time. The question posed is 'Will this kind of development cycle be representative for other sectors in China as well?' Will the Chinese food industry need to first face up to the global markets to advance its interests before they head back to the domestic markets? In fact, one should not be surprised to observe such a shift between domestication and globalisation given the great potential in China's domestic market. Affluent domestic consumers are the final beneficiaries in the apple case since they are ready to pay the premium prices for top quality products. If this development cycle holds for other agribusiness sectors in China, it likely has similar implications for other transitional countries such as India, which also enjoys a dynamic domestic market with increasing affluent middle class consumers.

The second observation is that China has a very reactive institutional mechanism that responds to the international demand for food safety in efficient ways. In the Chinese apple sector we did not see the public and private sectors join forces and act together to simply serve domestic interests. Rather, the international markets set the standard requirements while Chinese authorities adjusted their measures to help the apple industry meet these requirements. It is irrelevant whether these requirements came from public institutions, such as EU's packaging treatment condition, or from private sectors, such as GlobalGAP. As long as it was necessary to export apples, the Chinese government saw these requirements in their responsibilities and met them, sometimes in creative ways such as video-camera monitoring of packaging treatment and through financial subsidies for GlobalGAP. Yet we recognise that in China there are separate procedures for food safety control for domestic and export markets. Having two separate systems where those for export are more rigorous may provide other

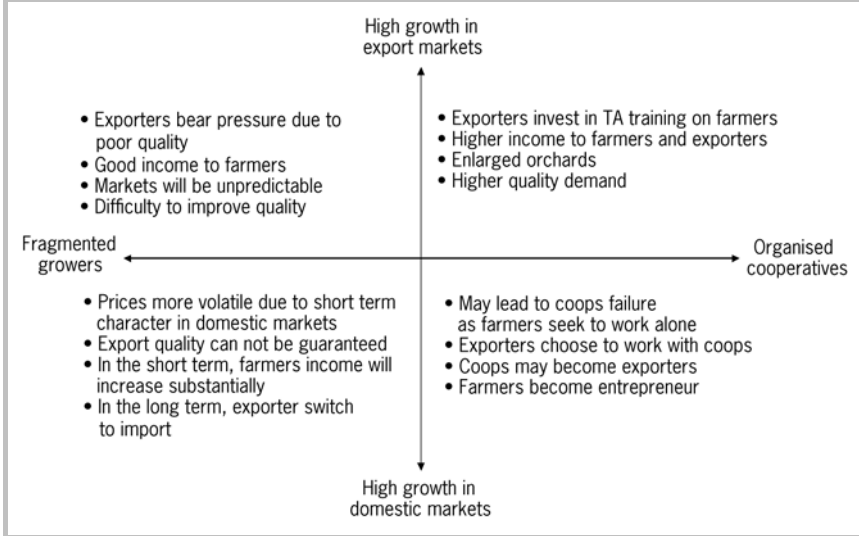
transitional countries facing sector resource constraints with export markets while retaining smallholders in the modern chain.

Although China's apple industry has made great progress in the last 20 years, it still faces many challenges. The major problem lies in smallscale production. Small-scale production makes it difficult to produce homogeneous products. Imperfect land markets hamper the transfer of land-use rights to other families. Small-scale production is not attractive enough to keep young generations at the field. Lack of public investment in R&D is another weak point. Before 1995, the government financed horticultural extension stations in each town to carry out technology extension work. Since then horticultural stations were leased to private persons and became profit-oriented, rarely providing farmers with technology supervision. Alongside public extension, R&D investment in variety breeding is also urgently required. Fuji apples are currently the dominant variety. Although the markets welcome this variety, relying on a single variety is still precarious in volatile markets.

The chain analysis allows us to do more than just understanding the process. We must try to anticipate changes in the future (Vermeulen et al., 2008). To facilitate policy discussion we identify two key factors which may influence the Chinese apple markets in the future and envisage four possible scenarios (Figure 3). One factor is the future development of farmers' organisations, and the other factor is the development of international and domestic apple markets. Will Chinese farmers remain as small scale and fragmented as they are now or will they be organised as cooperatives to enhance their market positions? Should the Chinese apple markets seek export business or domestic growth?

Although it is difficult to choose which scenario may be seen as the most favourable, Figure 3.3 clearly shows that the fragmented structure of growers is the major institutional obstacle for apple quality improvement as well as for long-term development in the apple sector. When compared to technical challenges, institutional obstacles may be seen as a more fundamental threat. Both farmers and traders have felt the urgent need to work together in order to succeed in the export market. They remain involved in the process of discovering an efficient cooperation and profit distribution mechanism.

Figure 3.3 Scenarios for the apple industry in China



4 The tomato paste marketing chain in Xinjiang

4.1 The rapid rise of the tomato paste industry in China

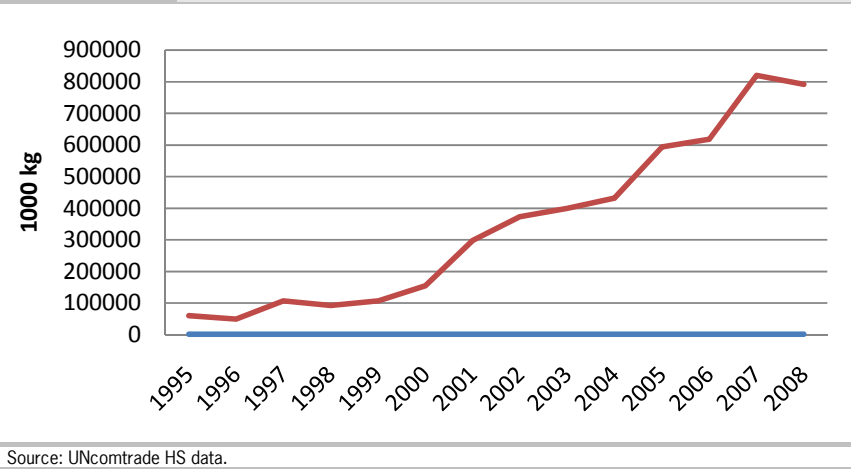
Chinese consumers are not familiar with tomato paste based products such as ketchup. Nevertheless, China is the world's largest tomato paste producer and exporter, with 2008 exports reaching 790,800 tonnes. China accounts for one third of the total world trade, and is followed by Italy, the USA, Portugal, Turkey and Greece.

	1995	2000	2005	2008
Total world export	1,144,223	963,444	1,515,488	2,311,166
China	43,268	68,417	296,857	764,813
Italy	324,137	314,621	482,437	747,638
USA	76,631	72,018	100,942	266,692
Portugal	124,842	79,513	100,055	177,900
Turkey	89,343	87,484	90,009	102,488
Greece	118,954	59,049	72,513	78,723
Germany	9,618	15,054	27,440	21,316
France	10,379	8,414	7,417	16,512
Switzerland	1,258	6,030	10,165	13,320
Mexico	23,183	5,051	5,879	12,460

Source: UNcomtrade HS data.

In the 1990s, China's tomato paste industry made an explosive entrance on the international market (Figure 4.1). China continues to expand tomato production and its processing capacity, thus tomato paste export continues to make inroads in the world markets due to improved quality, competitive prices and the trade agreement between China and the Association of Southeast Asian Nations. The main regions for the tomato processing industry are in northwest China, headed by Xinjiang and followed by Inner Mongolia and Gansu province. To date, the main production potential of the Chinese tomato paste industry is shared by Tunhe Co. and Chalkis Co. Together they take up 70% of the domestic market share.

Figure 4.1 Tomato paste export in China



The two largest tomato paste processing companies Tunhe and Chalkis are both located in Xinjiang. This high plateau enjoys a dry continental climate with long daylight hours and significant temperature differences between day and night. These are the ideal conditions for tomato production.

The development of the tomato processing industry in Xinjiang province has gone through four stages. The first stage is from the late 1980s to the middle of the 1990s. At that stage many tomato processing plants came into being although the capacity of those plants was small; the second stage was from the mid-1990s up to the end of the 1990s. At that stage, a large number of tomato processing enterprises went bankrupt because the price of tomato sauce on the international market was low and the production efficiency of those small-scale plants in Xinjiang was limited. The third stage was from 1991 to 2006. Along with the increase of the international price at that stage, tomato processing plants in Xinjiang increased their investment and increased their production capacity. The production of tomatoes and tomato paste increased steadily during that stage. The fourth stage is from 2007 to the present time. Because of the decline of tomato output in other major production countries, such as North America and European Union, the international price of tomato sauce increased rapidly on the world market. The existing tomato processing plants expanded their production capacity continuously, and more tomato processing plants are being set up. During this current stage the tomato paste production in both

China and Xinjiang province increased significantly along with the share on international markets.

The main purpose of this report is to analyse the marketing chain of tomato paste processing plants in Xinjiang, and the relationships between different types of tomato processing plants and tomato farmers. Once these aspects are understood, this report explores potential ways to improve the linkages between the Chinese tomato farmers, the tomato paste processing plants, and international markets.

4.2 Analysis of different types of tomato processing plants

The analysis is based on field surveys carried out by the above authors in October 2008. We found about 100 tomato processing enterprises in Xinjiang province. Given the characteristics and the scale of the industry, we selected three processing companies for the study, the two leading ones (Tunhe and Chalkis) and a small scale one called Weiteng. Furthermore, we also interviewed large state farm officials and individual tomato producers.

4.2.1 Business operation and market position of the tomato processing companies

Xinjiang Tunhe Co. is a subsidiary of COFCO Group (www.cofcotunhe.com). Tunhe started its tomato processing business in 1998. Besides tomato paste, it also refines sugar and produces soft drinks. This enterprise has more than 8,000 employees and its annual turnover reached CNY3.5b in 2008, of which 50% derived from the business of tomato processing. The daily processing capacity of fresh tomatoes at this plant is 56,000 tonnes. During 2008, it processed 2.4m tonnes of fresh tomato and produced 330 thousand tonnes of tomato paste (about 70 days of seasonal processing annually). It ranks as the second largest tomato processing plant in the world.

The origins of Xinjiang Chalkis Co. are as a para-military farm set up in the early 1950s and owned by the bureau of Xinjiang (www.chalkistomato.com). At the end of 1990s it was transformed into a shareholder company listed in Shenzhen Stock exchange. Chalkis's major business is tomato paste while it also produces tomato leucopenia and soft drinks.

The mid-small scale enterprise Weiteng processes only tomato paste. There were 42 employees in this company in 2008, and its total turnover is about CNY38.5m (or USD5.5m).

Comparisons of the operational business of the three abovementioned operations and entities are presented in table 2 below.

Items	Tunhe	Chalkis	Weiteng
Business activities	Tomato processing, sugar refining and soft drinks	Tomato processing and soft drinks	Tomato processing
Total staff (person)	8,000	3004	42
Turnover 2008 (RMB)	3.5 billion	2 billion	38 million
Processing plants	22	18	2
Domestic market share	50%	35%	Negligible

Source: Authors' personal interviews (2008).

There are clear differences in the marketing strategy of these three types of tomato processing companies. The marketing strategy of Tunhe is to target the international high-end industrial customers that require a high quality tomato paste as raw material. Chalkis pays great attention to both industrial and end-consumer markets internationally as well as domestically. The top managers of these companies are very optimistic about the potential of the domestic consumer market. Tomato is mainly processed into drink and tomato seasoning in the domestic market currently. However, with the rapid expansion of western-style food in the more developed coastal region of China, they believe that the domestic demand for tomato paste related products will also increase steadily in the following years. Due to the lack of enough capital and the limit of its scale the Weiteng Company has been exporting its products through export agents. The future marketing target of this latter company is to shorten this marketing chain and to create and develop a direct linkage between its products and international markets.

4.2.2 Marketing channels of the tomato processing companies

Japan and South Korea are the priority considerations in Tunhe's customer lists. Companies from these two countries require high quality tomato paste and they pay prices above other importing countries. Furthermore, Tunhe has established long-term relationships as the main raw material supplier of top world food manufactures. Their tomato paste passes the accreditation of Heinz, Unilever, Kraft, Nestlé and others. Tunhe also has connections with some European companies, particularly with Italian companies. However, those European companies usually do not import tomato sauce for the consumers in their own countries, but further process the imported tomato sauce from Tunhe, and then re-export their products to African and Middle Eastern countries. Recently Tunhe began carrying out direct business with African and Middle Eastern customers.

While Tunhe is still focusing on presenting tomato paste in bulk and large packaging, in recent years Chalkis has begun to target the small-packaging and high-end consumer products. Their purchase of France's largest tomato processor 'Conserve de Provence' in 2004 can be seen as their first step in this direction (Hénard, 2005). Through the well-established French brand Le Cabanon, Chalkis wishes to realise its objectives of entering the European consumer markets. Thus, the European markets account for 70% of Chalkis's export value, followed by Russian Federation (20%) and Asian pacific (10%). The small-package processed tomato products take many different forms: tomato sauce, tomato juice, diced tomato, individual packages of tomato paste, et cetera. In 2007, the total value of small-package processed tomato products has reached more than USD100m, which accounted for about 50% of their total exports.

Weiteng exports their tomato paste through trade agents. The agents will present a certain percentage in the form of advance payment to Weiteng, which can reduce their cash liquidity pressure when sourcing fresh tomatoes from the farmers. Because the mutual trust between Weiteng and the direct importers from the other countries has not been sufficiently established yet, they must continue exporting through the agents. However, they expect that in the near future they may deal directly with the importers to shorten the supply chain, and enhance their competitiveness. Currently Weiteng is required to transport its tomato paste to Tianjin port and to also arrange for port storage 3,000km away from Xinjiang. There are two reasons why they prefer to store their products in Tianjin and not in Xinjing. The major reason is that it can export the products timely from Tianjin port. Because Xinjiang is an inland province, it takes about 7-10 days to transport products from Xinjiang to the eastern port. Due to the limi-

tation of the transport capacities, it is not easy to find freight trains timely from Xinjiang to ports in eastern region. The other reason is that, the storage costs in Tianjin are fairly reasonable.

4.2.3 The acquisition of fresh tomatoes by the different tomato processing companies

Although the scale of each of these three enterprises is very different, the acquisition models of fresh tomatoes are similar. All of the three enterprises have multiple raw materials acquisition modes, and the main mode is to contact tomato farmers directly. The three companies we visited own only small-scale tomato production bases.

Tunhe purchases fresh tomatoes by signing supply contracts with local farmers. The contract provides detailed prices, methods of payment, and quality requirements of the fresh tomatoes. Tunhe supplies the contracted farmers with seeds, fertilisers, pesticides, et cetera, and requires the contracted farmers to undertake required production using the inputs supplied. Tunhe will however charge for the costs of those inputs upon the delivery of the fresh tomatoes. Tunhe also sends technicians to check the pesticide residues on the leaves, flowers, and fruit during the whole process of farmers' production. In 2008, there were 200 thousand contracted farmers who accounted for 90% fresh tomatoes Tunhe sourced. The second pattern of sourcing is to rent large farms and then hire farmers to cultivate tomatoes; the third way is to purchase land and to produce fresh tomatoes on their own production base. In 2008, only 3% of Tunhe's processed tomatoes came from its own production base. To meet the needs of market development and ensure a stable supply Tunhe decided to expand its own fresh tomato production base vigorously in future years. It is expected that during the 2009 season the share of fresh tomato produced on its own production base will increase to 20% and by 2011 their share will increase to 50%.

Due to historical connections Chalkis has easy access to state-owned farms. In 2004, more than 80% of Chalkis's fresh tomatoes were supplied by state owned farms, however that percentage has been declining in recent years, and by 2008, only 50% was supplied by state-owned farms. In addition Chalkis also signs supply contracts with township governments and village leaders, who will then carry out the production contracts on behalf of the plant. When the contracted suppliers cannot provide sufficient fresh tomatoes Chalkis will purchase fresh tomatoes from small traders. Similarly to Tunhe, in order to ensure the quality and quantity of fresh tomato supply, Chalkis is beginning to rent/pur-

chase land and develop its own production base. Its goal over the next 10 years is to expand the fresh tomato production to be provided by its own production base to at least 50% of its fresh tomatoes requirements. The main pattern carried out by Weiteng to source fresh tomatoes is to sign contracts with farmers working on the state owned farms. About 80%-90% of the fresh tomatoes it processed were purchased from those contracted farmers. The rest was purchased from other local farmers. Weiteng has no intention to establish its own production bases.

4.2.4 Price transmission and profit of processing enterprises

There are a number of factors that influence the price of tomato paste on the international market. The main factors are:

- 1) the natural conditions and output of China, U.S., Italy and other major tomato-producing countries;
- 2) the storage and the production plan of the major tomato paste plants in the world;
- 3) other political and economical conditions of the main countries (for example, the agricultural subsidy policy of Europe and the CNY exchange rate policy).

At present the export of China's tomato paste accounts for 30% of the world total export, so changes in the CNY exchange rate will have a pronounced impact on the world price of tomato paste.

The processing period of tomato paste usually begins in late July and lasts until late September, amounting to about 70 days. The big suppliers such as Tunhe and Chalkis normally negotiate with their larger customers and set the tomato paste price in April each year when they can forecast the tomato harvest. In the period of 2002 to 2005, the market price remained steady. The price of tomato paste has begun to rise after 2005. Due to unfavourable natural conditions and other reasons, the supply of tomato paste was significantly less than the demand. This brought about tomato paste price exceeding USD1,000 per tonne on the international market by 2007. Over the past 2 years, due to the volatility of international market prices, the international price was only set in mid - August and even in September.

How will the change of international price be transmitted to domestic plants and farmers? And how will it affect the profitability of tomato processing plants? In general, when processing companies sign contracts with farmers, the contract price is determined by farmers' production costs while allowing farmers

the average net profit of tomato production of around CNY200-300 per mu. In order to give tomato farmers enough incentive to produce tomatoes and sell their product to the processing plants, the contract price needs to be high enough to ensure farmers' expected average profit. Nevertheless, there will be some differences between the contract price and the real purchasing price, usually with the real purchasing price being higher than the contracted prices. The purchasing price of fresh tomatoes was between CNY200 and 250 per tonne in 2004, and the price increased to CNY300-350 per tonne. Due to the fact that the supply of fresh tomatoes was much below the processing capacity in Xinjiang region, and the demand of tomato paste on the world market was high, many enterprises had difficulty in fulfilling their potential capacity. Our interviews with Chalkis indicated that in 2008 its purchasing price of fresh tomatoes was CNY600 per tonne on average, which is double that of their contracted prices. In 2008, the cost of fresh tomatoes reached 60% of the total production cost. When the tomato paste plants negotiate prices with large international companies, the price has to be set at a level which ensures the profit of tomato processing plants is no less than 20%. When dealing with other importers, the FOB price will be calculated as follows: the price on the European market minus freight, tariff and USD50 of profit per tonne.

Table 4.3 presents the costs and profit of the small scale processing company Weiteng which sells 3,600 tonnes of tomato paste per year. The gross revenue is CNY27m, and the total cost is about CNY18.8m. The cost of fresh tomatoes accounts for 58.5% of the total cost. The gross profit is estimated at CNY8.2m.

	Quantity	Value	Percentage in total cost	Remarks
Gross revenue (CNYm)		27		
Output (t)	3,600			
Price (USD/t)	1,060			
Cost (CNYm)				
Fresh tomato		11	58.5	
Water, electricity, coal		1.6	8.5	
Equipment maintenance		.80	4.3	
Depreciation		.60	3.2	
Packing		2.20	11.7	
Transportation cost		1.60	8.5	To Tianjin port
Labour cost		.60	3.2	Does not include managers' wage
Tax		.40	2.1	Already deducted export tax rebate
Total		18.80	100	
Net profit (CNYm)		8.20		

Source: authors' personal interview, 2008.

4.3 Observation and conclusions

Over the last two decades, China's tomato processing industry has made a great leap in joining the international markets. China continues to be the largest producer of tomatoes and the largest exporter of tomato paste worldwide. However, this rapid development has caused several concerns for the future development of the industry.

In the first instance the over capacity of processing is contrasted with the shortage of fresh tomato supply. Due to the high profitability and low entry barrier, more and more capital is invested in the tomato processing industry. Some local governments even provide incentives in order to attract private investment in their regions for tomato processing. Taking Xinjiang as an example, the processing capacity in Xinjiang is estimated to require 6m tonnes of fresh tomatoes, whilst the actual supply is around 4m tonnes. Higher tomato prices and lower

quality are the direct result of competing for fresh tomatoes amongst processing companies.

Furthermore to that distrust exists between processing companies and tomato farmers. In order to ensure sufficient supply of fresh tomatoes, processing companies are all engaged in contracting farmers. Some even provide input supplies and technical assistant to farmers during the process. However, individual farmer get the feeling of becoming 'price takers', and they have almost no bargaining power over the tomato price. In 2008 the supply of fresh tomatoes was limited. Although farmers had signed contracts, they still looked for higher bidders. In that environment processing companies and farmers lost trust in one another. Farmers observed the price of tomato paste increasing by 100% on the international market, and the production costs also increased during 2008. The farmers saw it unfair that processing companies did not pay a higher price for tomatoes than the price they had contracted. In contrast processing enterprises have no legal powers over farmers who had signed supply contracts with them. At this moment, processing companies are planning to bring the production under their control by renting or purchasing land. They hope by this way to bypass farmers. However, given the limited land available in China and small scale household production characteristics, the processing industry cannot go too far in the realisation of their ambitious plans.

5 Conclusions

In this section, we will synthesise the report results, and provide recommendations to enhance the horticultural trade between China and the EU.

The bilateral trade in fruits and vegetables between the EU and China is unbalanced. China exports far greater quantities of vegetables and fruit to the EU than the EU to China. Although the EU and China both produce on family-based farms, their structure, production, marketing and policy are significantly different. Though we emphasise that the EU farms are quite small when compared with farms in the US, they are still regarded large when compared with family farms in China. In terms of production volume, China produces larger quantities of vegetables and fruits overall; however, the productivities and yields are much higher in the EU, and even extremely higher in some countries. This may partly be explained by the heavy investment required in EU agriculture as well as the high cost of labour. As far as the food distribution system is concerned, supermarkets play a dominant role in most of EU countries, whilst in China, wholesale markets are the main hub circulating agricultural commodities national wide. Supermarkets however are emerging at a rapid pace.

We therefore note that after decades of exploiting agriculture in order to supply cheap raw materials to support industrialisation, the central Chinese government is now turning towards subsidising the agricultural sector in order to fill the income gap between rural and urban areas. Agricultural subsidies in EU already exist for more than half a century, and a comprehensive operating system is long established.

Both the apple and tomato cases illustrate the impact of globalisation on the Chinese agricultural sector. The major steps the Chinese government has taken are liberalising domestic markets, stimulating entrepreneurial spirits, embracing globalisation, facilitating product quality improvement, et cetera. Our study reveals that both cases are adopting a highly coordinated supply chain through either vertical integration or long term persistent relationships. The major difference between these two chains is that the apple export chain is more fragmented due to a large number of players, whilst the tomato paste chain is highly concentrated - with two players playing a major role. This may partly explain the declining of Chinese apple prices over the years due to severe competition between the Chinese exporters themselves.

Although there is a major trade unbalance between the EU and China in fresh produce, there are signs that things are improving towards a more balanced development. Several protocols for importing EU fruits to China have completed negotiations or are in the process, such as apples from France, citrus fruit from Spain, kiwi fruit from Italy and pears from the Netherlands. Opportunities exist for both entities - China and the EU. On the basis of mutual benefit principles, the following recommendations are provided:

- *Enhancing producers' organisation in China*

It is evident that the over fragmented production system in China is a major bottleneck in product quality improvement. Although the new agricultural co-operatives laws were adapted recently, the current development of new co-operatives is far from an autonomous, self-help organisation controlled by their members. On this point, the Chinese can learn from the EU bearing in mind that the cooperative development in EU has a history of over two centuries, and is well established in almost all agricultural sectors.

- *Greater transparency in China*

Private sectors in EU often complain the nontransparent system in China concerning Sanitary and Phytosanitary (SPS) issues, such as the lack of information regarding procedures and unclear task division between national and provincial competencies. Thus the EU is calling for the recognition of EU controls in China and the relaxation of registration procedure for plants and seed materials.

- *Market diversification*

The fresh produces in EU markets can be regarded as saturated, which has led to continuous declining in prices in recent years. China should seek new market opportunities beyond the EU, such as the Middle East and Africa. More and more private sectors are realising that these markets are quite easy to operate with reasonable profitability.

- *Focus on quality and image*

It is unrealistic to export large quantities of fresh produce from the EU to China. However, it is possible for the EU to establish its niche markets in China for selective products to focus on the top-end consumers. These small segment consumers can afford to pay a premium for quality products. Furthermore, food consumption in this segment is not only of nutritional value, but also holds associations with lifestyles and personal values. It is therefore recommended to cultivate unique images alongside the launching of EU agricultural products, on such societal concerned issues as sustainable production, animal welfare, et cetera.

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- <http://ec.europa.eu/agriculture/rica/>
- http://ec.europa.eu/agriculture/capreform/fruitveg/index_en.htm

Appendix 1

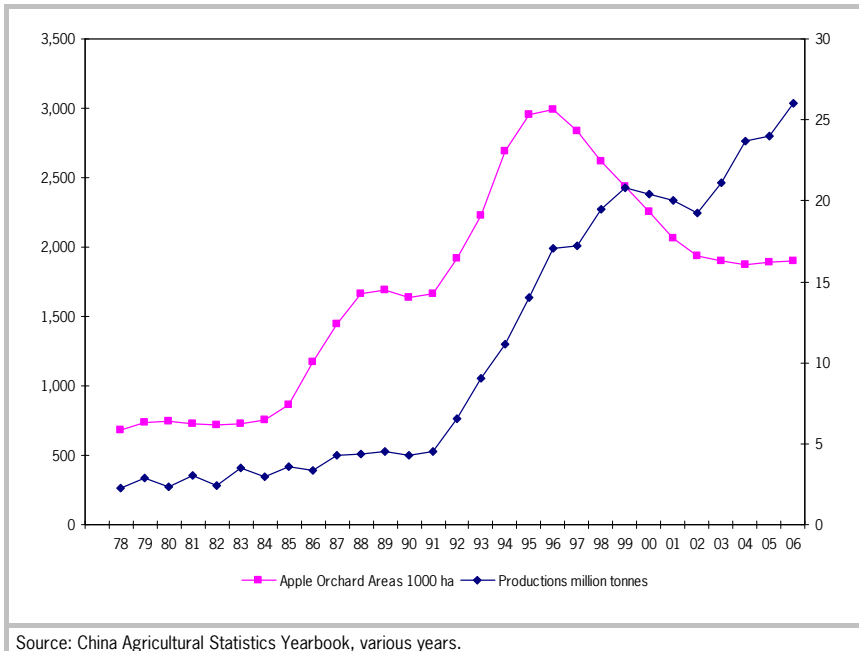
The total trade value of fruits and vegetables between EU and China for each EU member countries from 2000 to 2007

EU member countries	Export value (USD1,000)	Import value (USD1,000)
Austria	21,729.857	2,736.964
Belgium	332,173.207	19,492.173
Bulgaria	57,736.519	2,347.629
Cyprus	5,897.591	85.426
Czech Republic	107,466.647	55.053
Denmark	52,674.465	3,287.176
Estonia	96,060.294	855.963
Finland	23,826.443	23,473.754
France	587,844.881	10,910.009
Germany	1,992,520.346	19,733.356
Greece	97,728.050	4,246.787
Hungary	29,450.649	4,324.447
Ireland	16,187.095	36.794
Italy	1,119,888.765	16,723.280
Latvia	22,061.247	1,711.102
Lithuania	27,284.881	2,519.363
Netherlands	1,837,400.897	18,445.882
Poland	146,033.021	13,595.786
Portugal	47,647.972	753.406
Romania	167,138.555	0.206
Slovak Republic	10,806.202	385.725
Spain	735,279.257	21,382.346
Sweden	93,260.972	70,765.341
United Kingdom	654,205.988	14,095.500

Source: UNcomtrade data.

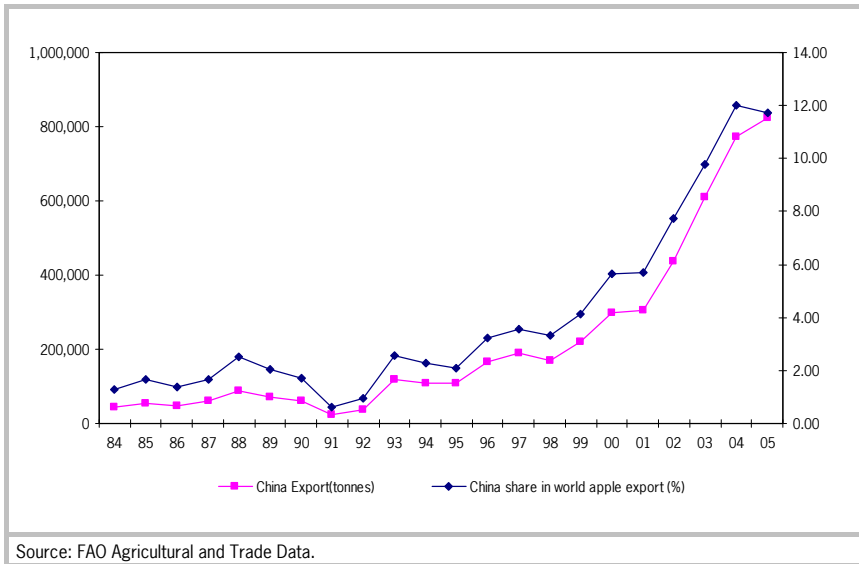
Appendix 2

The development of apple production in China,
1978 to 2007



Appendix 3

Chinese apple exports and global export share from 1984 to 2005



Appendix 4

Tomato paste import and export quantity in China from 1997 to 2006

Year	Import quantity (tonnes)	Export quantity (tonnes)
1997	46.2	106,667.5
1998	151.8	92,344.8
1999	69.9	106,764.0
2000	921.9	154,606.0
2001	2,663.2	298,114.7
2002	2,110.8	373,424.0
2003	776.2	401,331.5
2004	877.7	437,380.6
2005	624.6	602,335.9
2006	1,048.4	631,157.4
2007	1,623.7	841,805.4
2008	1,797.6	818,512.6

Source: Uncomtrade.

Appendix 5

Wuyi Farm, a state-owned farm in Xinjiang

The Wuyi State Farm has 50,000mu of land and 2,000 farm workers. The farm workers are divided into 15 units. Before 1985, the farm workers receive wages from their units. After the reform in 1985, farm land was directly contracted to individual farmers, ensuring that each farmer received about 20mu of arable land. As from that moment farmers rather than the units were required to be responsible for profit and loss. Farmers sign contracts with the Wuyi farm once a year to rent the land. The annual rent per mu was around CNY270-280 in 2008. Farmers are also required to pay CNY100 per mu for water irrigation costs.

Small-scale farmers such as families with two household members usually plant 30-40mu of tomatoes. Large scale farmers can plant more than 100 mu of land. During the harvest season those large farmers need to hire outside labour. The cost of labour has increased considerably in recent years. The labour cost increased from about CNY15 per day 3 years ago to the current level of CNY40 per day. Besides the increase of labour costs, plant diseases and insect pests are additional important factors affecting tomato production. Crop rotation for tomato cultivation is particularly important. Some farmers even rotate crops every year to avoid serious plant disease.

The Wuyi Farm signs contracts with Chalkis for the supply of fresh tomatoes. The farm then allocates the supply quota to farmers in different units. During the tomato harvest periods from late July to mid-September, the Wuyi Farm coordinates the harvesting days and arranges delivery trucks for each unit.

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