HORTIN II Co Innovation Program

Strengthening fruit supply chains in Indonesia

Focus on Rambutan and Avocado

Mission Report 16

Alex van Schaik (Wageningen UR, AFSG)

Iskander Zulkarnain (HPSP, INA, Fresh Studio)I

Marcel Stallen (Fresh Studio Innovations Asia)

Wageningen, Jakarta, July, 2008

The purpose of the HORTIN II programme is to contribute to the development of cost effective high quality value chains for the selected commodities hot pepper, shallot and sweet pepper. Among others this can be achieved when technology development takes place in close collaboration between public institutions, farmers and private companies.

In Indonesia, the programme is carried out by the Indonesian Vegetable Research Institute (**IVEGRI**) in Lembang. In the Netherlands Applied Plant Research (**APR**), WUR-Greenhouse Horticulture (**GH**) and Agricultural Economics Research Institute (**AEI**), all part of Wageningen University and Researchcentre, are the principal partners.

Addresses:
Indonesian Vegetable Research Institute
Address : Jl. Tangkuban Perahu 517 Lembang-Bandung 40391, West Java, Indonesia
Tel. : +62 22 2786 245
Fax : +62 22 2786 416
E-mail : dir_ivegri@balits.org or balitsa@balitsa.org
Internet : www.balitsa.org

Agricultural Economics Research Institute (LEI)
Address : Burgemeester Patijnlaan 19, Den Haag, The Netherlands
: Postbus 29703, 2502 LS Den Haag, The Netherlands
Tel. : +31 70 335 83 30
Fax : +31 70 361 56 24
E-mail : informatie.lei@wur.nl
Internet : www.lei.wur.nl

Applied Plant Research (Praktijkonderzoek Plant & Omgeving B.V.)
AGV Research Unit
Address : Edelhertweg 1, Lelystad, The Netherlands
: Postbus 430, 8200 AK Lelystad, The Netherlands
Tel. : +31 320 29 11 11
Fax : +31 320 23 04 79
E-mail : infoagv.ppo@wur.nl
Internet : www.ppo.wur.nl

WUR-Greenhouse Horticulture (Wageningen UR Glastuinbouw)
Address : Violierenweg 1, Bleiswijk, The Netherlands
: Postbus 20, 2665 ZG Bleiswijk, The Netherlands
Tel. : +31 317 48 56 06
Fax : +31 10 52 25 193
E-mail : glastuinbouw@wur.nl
Internet : www.glastuinbouw.wur.nl

Programme Team

If you think you could contribute to the goals of HORTIN II in any way, please contact one of the Programme members.

	Indonesia	**Netherlands**
Programme management	Dr.Nikardi Gunadi, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: NGUNADI@BDG.CENTRIN.NET.ID	Dr. Arij Everaarts, APR, General management Telephone +31 320 291 671 Fax +31 320 230 479 E-mail: ARIJ.EVERAARTS@WUR.NL Dr. Andre de Jager, AEI, Co-innovation Telephone +31 70 3358 341 Fax +31 70 3615 624 E-mail: ANDRE.DEJAGER@WUR.NL
Sweet pepper pilot project	Dr.Nikardi Gunadi, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: NGUNADI@BDG.CENTRIN.NET.ID	Ruud Maaswinkel, WUR-Greenhouse Horticulture Telephone +31 317 485 537 Fax +31 105 225 193 E-mail: RUUD.MAASWINKEL@WUR.NL
Shallot pilot project	Dr. Rofik Sinung Basuki, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: ROFIK@HOTMAIL.COM	Lubbert van den Brink, APR Telephone +31 320 291 353 Fax +31 320 230 479 E-mail: LUBBERT.VANDENBRINK@WUR.NL
Hot pepper pilot project	Dr. Witono Adiyoga, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: VICIANTI@YAHOO.CO.ID	Herman de Putter, APR Telephone +31 320 291 614 Fax:+31 320 230 479 E-mail: HERMAN.DEPUTTER@WUR.NL
Quantitative Economic Analysis	Dr. Witono Adiyoga, IVEGRI Telephone +62 22 2786 245 Fax +62 22 2786 416 E-mail: VICIANTI@YAHOO.CO.ID	Marcel van der Voort, APR Telephone +31 320 291 312 Fax +31 320 230 479 E-mail: MARCEL.VANDERVOORT@WUR.NL

Table of Contents

1. Summary

The following fruit product market combinations (++) were selected for further exploration and development (see table below). The major reasons for inclusion are the opportunities to connect producers with modern fruit markets and the feasibility in particular and to enhance the Indonesian fruit sector in general.

Product / Market combinations		Rambutan	Avocado	Other fruits
Domestic market	Traditional			
	Retail / modern		++	Baby mango
Export	Europe (EU)	+/-	+	Baby mango
	Middle East	+/-		
	Regional[1]	+/-		
Processing	Frozen	++		
	Canned			
	Container			

We defined the following two supply chain projects in close consultation with stakeholders in the fruit sector (rambutan and avocado) in Indonesia.

Rambutan
Processing rambutan during the peak season might provide an alternative outlet for professional as well as homestead producers and could help to keep prices at a more acceptable level and create new marketing opportunities. A feasibility study is proposed to explore the economic viability of establishing a processing factory or initiate village based small scale processing of rambutan. Aspects of such a feasibility study are logistics and organization; partner identification; lessons learnt from the Thai canning industry; market survey and prices and opportunities for smart combinations with mixing rambutan and other canned fruits (pine apple).

Avocado
At the domestic market the indigenous Indonesian avocado, in particular fruits from Probolinggo and from Garut are very much appreciated, but the sector faces problems to regularly supply a consistent quality avocado to modern markets. There is an imminent danger that retailers will import avocado from abroad to satisfy their needs in the future. Within the Indonesian avocado supply chains there is some awareness of quality but quality classes are flexible and vary with the season and area. There is a need to standardize and fix at least some quality classes thus ensuring the quality and the origin of the fruits. This process of raising quality awareness should be accompanied by capacity building on product handling at harvest, improved packaging, transport, cooling, grading etc that are important measures to maintain the quality of avocado in the supply chain. The purpose of the pilot that is proposed is to develop an objective and clear-cut system describing the quality of avocados for communication in the supply chain, accompanied by the introduction of cultural and post harvest practices to improve product quality.

Baby mango
Although not included in the terms of reference, consultants noticed a very fine quality baby or mini mango (variety Gedong Gincu, about 200 gram per fruit, round – kidney shaped, yellow skin) in the market. Trough the eyes of the modern, western consumer this mini mango could be an attractive product. Small fruits and mini vegetables fit in the market trend towards one-portion fruits (tommies, mini cucumbers, berry kiwi etc.).

[1] *Regional market: Brunei, Korea, Singapore, Japan, Taiwan etc*

2. Introduction

2.1. Background of the mission

Indonesian authorities, through the Directorate General (DG) for Horticultural Production, have expressed the wish to include fruit production and fruit supply chains in the ongoing HORTIN-II co innovation program. According to DG Horticultural Production, the competitive position of Indonesian fruits at the world market but also at the domestic market could be improved considerable. Reasons for this situation are among others the fragmented structure of the fruit sector and the absence of packaging, treatment and cool store facilities in Indonesia. Strengthening Indonesian fruit supply chains by means of innovative technologies could result in a better competitive position (in terms of quality, availability or price of the products) of specific Indonesian fruits, the Indonesian fruit sector as a whole and its actors.

The objective of this mission: '*Strengthening fruit supply chains in Indonesia; focus on Rambutan and Avocado*' is to assess selected Indonesian fruit supply chains in comparison with neighbouring countries like Malaysia, Vietnam, Philippines and Thailand. Comparisons need to be made with regard to production systems, supply chain organisation, transport and handling costs, but also on fruit quality and requirements in relation to logistics, transport and transit time. This mission should lead to exploring the potential for import substitution by domestic fruit and / or the potential for regional and international export of Indonesian fruit species. The mission should come up with recommendations for improvements in two potentially successful pilot fruit supply chains.

2.2. Terms of Reference

The objectives of the Fruit Supply Chain Mission are (see annex 3):

- To conduct an assessment of Indonesian fruit supply chains in comparison with neighboring countries.
- To identify potential niche markets for Indonesian fruit products.
- To identify two potentially successful domestic or international fruit supply chains.
- To formulate a strategy and action plan to strengthen these two fruit supply chains using innovative technologies.

2.3. Focus on Rambutan & Avocado

After consultation with the Director General of Horticultural Production of the Ministry of Agriculture in Indonesia, we have jointly selected Rambutan (*Nephelium lappaceum L.)* and Avocado (*Persea americana Mill)* and their supply chains as major objects of this mission. Rambutan and avocado are perceived as typically Indonesian products and because of its uniqueness there could be a market potential and opportunities to connect Indonesian farmers with modern markets. Another typical Indonesian fruit product, unknown in large parts of the world is the snake fruit (*Salacca zalacca*). After due consultation, this product was not included in the study.[2]
It is the opinion of consultant that rambutan, as a typical Indonesian product, is somewhat neglected in various studies executed by ACIAR[3] and other agencies. Currently there are no

[2] *In the mean time, Indonesia has also concluded a contract with China to export large volumes of high quality Salacca (Salacca bali, renowned for its quality) to China. China will also support Indonesia to prepare growers and traders for the export.*

[3] *ACIAR = Australian Centre for International Agricultural Research*

concerted actions or programs to improve the rambutan (and avocado) sector. It was assumed that a higher quality rambutan has potential at the domestic market and could have spin off for export markets.
In Southern America and elsewhere avocado is produced for export markets mainly. However, in Indonesia avocado is a major product at the domestic market and deserves more attention because of its marketing opportunities and healthiness.

2.4. Methodology and approach

Reports and literature on Indonesian and Southeast Asian fruits in general and rambutan and avocado in particular were studied on beforehand. Some case studies on domestic and international fruit supply chains in general with relevance for rambutan and avocado were analysed. The local HORTIN consultant (Iskander Zulkarnain) prepared a program, he has collected data and information and identified partners, and production centres in Indonesia.
From June 16 – 20, consultants visited the major production centres of rambutan and avocado together with staff of DG Horticultural Production (Directorate Fruits). Producers, traders, retailers and service producers were interviewed about the current and past situation, bottlenecks, and improvements in their fruit supply chains. We focussed on rambutan and avocado only. Interviews were conducted group wise or one to one depending on the local situation. Structured checklist per group (traders, producers, service providers, retailers) and lists with questions were prepared and used. Questionnaires and checklists are attached in Annex 2.
After due consideration the team has selected two supply chains (product market combinations) with potential for further improvement. As a team, we also jointly developed and described the case studies for further investigation and supply chain development.

Because of time constraints, consultants did not yet discuss the results of the mission and the proposed cases with supply chain partners. At a later stage, after this consultation detailed action plans for the two pilot projects will be formulated. Exploration of opportunities for public and private co-funding of pilots projects will also be done later once the pilots have been formulated and agreed upon with Indonesian partners. In general, there appear to be funding opportunities with the HPSP [4] program and the AusAid (ACIAR) program.
It was agreed with the Director General Horticultural Production and the Agricultural Attaché of the Royal Dutch Embassy that the debriefing about this mission and its results would be done through the e-mail in July 2008.

The following analytical framework was used in which we distinguish several major markets and product purposes (product market combinations, PMC's)

Product / Market combinations		**Rambutan**	**Avocado**	**Other fruits baby mango**
Domestic market	Traditional			
	Retail / modern			
Export	Europe (EU)			
	Middle East			
	Regional[5]			
Processing	Frozen			
	Canned			
	Container			

[4] *HPSP: Horticultural Partnership Support Program*

[5] *Regional market: Brunei, Korea, Singapore, Japan, Taiwan etc*

A modified Porter analysis and a standard SWOT analysis was deployed to determine the competitiveness of avocado and rambutan at selected markets and to identify opportunities and threats of these fruits. For both fruits, we have identified a specific strategy for strengthening supply chains.

2.5. This report

This mission report entirely focuses on rambutan and avocado. In chapter 3, the current situation in terms of production and trade at the world market and at the Indonesian market is summarized and discussed. The findings and conclusions of the rapid supply chain analyses, including an assessment of the production sector is described in paragraph 3.2.2 and 3.3.2.
In chapter 4, the previous results are analysed by means of a SWOT analysis and a Porter analysis. This results in an indication of the competiveness of avocado and rambutan at pre-selected markets. These analyses are the basis for the specific strategies, which are developed for rambutan and avocado and described in chapter 5. Tentative supply chain projects (pilots) are described in chapter 6 and are yet to be worked out into more detail as a follow up on this mission.

Herewith consultants would like to thank staff of the Agricultural Department (Dinas Pertanian) Subang, Garut and Probolinggo, Staff of the Directorate General Horticultural Production (fruits), farmers and traders. They supplied us with all the valuable information we needed to execute this mission in a relatively short time.

Haarlem, Wageningen, Jakarta,

July 2008

3. Current situation & analysis

3.1. Fruit sector in Indonesia; an overview

Indonesia has excellent growing conditions for a wide range of tropical fruit species. Banana, mango, citrus and durian from Indonesia are well known products. The value of local fruit production almost doubled from US$ 2.736 million in 1994 to 5.279 million US$ in 2004. During the same period the demand for exotic and temperate fruits in Indonesia has also grown and the import of fruits into Indonesia has increased from 76 million US$ (1994) to 215 million UIS$ in 2004. This spectacular growth can be attributed to an increase in the consumption of apples, pears and grapes imported from the USA, Australia and South Africa. This increase in imports is fuelled by a growing Indonesian middle class spending a larger share of their income on good quality fresh products and a growing retail sector in Indonesia.

It is estimated that about 8 % of all fresh fruits and vegetables in Indonesia is sold through retail outlets in 2007. This volume is likely to grow in the next couple of years. It is striking that about 70 to 80 % of all fruits sold through retail outlets are imported. To change this situation larger retailers such as Carrefour and MataHari are putting in many efforts to substitute imports fruits by domestically sourced fruits.

The Indonesian fruit sector faces a number of challenges such as:

- Price and quality of products, the costs of production, transport and distribution are high and sometime imported fruits are of a better quality and of a lower price.
- Fragmented supply chains and small scale of operations resulting in an in efficient logistical system and relatively high post harvest losses. Costs to get the products from the field into the shops in the major cities are relatively high.
- In transparency of supply chains due to a large numbers of operators and actors involved.

Recently the following challenges were added to the fruit sector further weakening the competitive positions of Indonesian import and export supply chains:

- New import regulations of the Indonesian Government adding costs to the import of fresh products.
- Relatively high airfreight rates to neighbouring countries and to other continents as compared with rates from competing countries such as Malaysia and Thailand.
- GlobalGAP certification required to produce for high quality domestic and international markets.
- Absence of local Indonesian food safety standard benchmarked to the International recognized GlobalGAP standard.
- Need for transparency in supply chains and direct sourcing (short lead times)

The above-mentioned factors, albeit not exhaustive, result in a poor competitive position of Indonesian fruit at the domestic and regional markets. This is reflected by the export figures of fresh fruits and vegetables from Indonesia that are much lower as compared with other developing countries. In 2004 only 11,8 million US$ of fruits was exported.

Product (top 7 plus rambutan, avocado) year	2005 (*1000 MT)	2006 (*1000 MT)
Durian	566	747
Orange (2)	2,214	2,565
Mango	1,413	1,622
Mangosteen	65	73
Pineapple (3)	925	1,428
Papaya	549	643
Banana (1)	5,178	5,037
Rambutan	658	801
Avocado	228	239

Table 3.1: Fruit production in Indonesia, 2005 and 2006 (1000 MT)*

3.2. Rambutan

Rambutan (*Nephelium lappaceum L.*) is cultivated throughout the humid tropics of Asia and in small number in the humid tropics of America, Africa and Australia. The fruit is considered as a typical South East Asian fruit and major production centres are Thailand, Indonesia and Malaysia. The sweet tasting fruits are eaten fresh and the fruits can be canned or used in jam. Apart from the top-3, producers (see table below) rambutan production has been stimulated in the Philippines recently by the introduction of superior varieties from Indonesia.

Rambutan is a non-climacteric fruit and needs to be harvested when it is fully ripe. For a good quality fruits need to be picked at least twice a week, In Indonesia and Malaysia fresh fruits are marketed per bunch and in Thailand fruits are sold individually.

Yields vary widely in between countries and within each country and range from two until 12 ton per hectare. Production figures per hectare can be as high as 10-12 ton per hectare in Thailand when the fruits are professionally grown in orchards. Seasonal over production is inherent to the fruit, huge price fluctuations are a major problem apart from post harvest, and quality related issues. Shelf life of rambutan is short (a few days only), due to its large surfaces with hairs the fruits rapidly loose weight, and dry out. Drying out of the fruits is easily recognized by the hairs becoming yellowish and brownish. Keeping the fruits moist and shaded prolongs the post harvest life of the fruit. Shrink foliage wrapping of fruits and cold storage of the fruits at 5 – 10 ^{0}C also have a positive effect on the shelf life and the quality of the fruits.

3.2.1. The global rambutan scene

Production in the major production countries is stable over the years:

Year Country	2000 (*1000 MT)	2002 (*1000 MT)	2004 (*1000 MT)
Thailand	673	700	700
Indonesia	330	350	350
Malaysia	133	69	70
Philippines	12	12	12
Other countries	20	20	20
Total production (world)	1,169	1,151	1,152

*Table 3.2: Production of rambutan per country (production figures * 1000 Mton)*

No trade data are available for Rambutan

3.2.2. Rambutan production in Indonesia

Rambutan in Indonesia is grown in the lowlands up to an altitude of 600 meters above seal level. Major production Centres can be found in the western parts of Indonesia in particular at Java, Sumatra and Kalimantan. The harvesting period is November until March (4 months with a peak in December and January). The total production in Indonesia fluctuates from 263,000 Mton to 350,000 Mton per year. This volume of rambutan is equivalent with 3,5 % of the total fruit production in Indonesia. The majority of the rambutan fruits are sold fresh at the domestic market through the Jakarta, Bandung and other wholesale markets or directly to traditional wet markets. During the peak season large quantities of fruits are also sold for bottom prices at the roadside or directly (via a local trader) on the market. Only small quantities of rambutan are exported to the Middle East, Europe and neighbouring countries such as Taiwan, Singapore and Brunei.

The production season of Thailand and Indonesia are not overlapping and complementary to each other. Some fresh rambutan from Thailand is exported to Indonesia during the period May – August.

Production month	J	F	M	A	M	J	J	A	S	O	N	D
Thailand												
Indonesia												

Recent data (2006) of the Directorate General Horticultural Production show that most of the rambutan in Indonesia is produced in West Java, followed by East and central Java (table 3.4). Java as a whole is the centre for rambutan production as compared with Kalimantan and Sumatra where relatively small quantities of rambutan are produced. There are also some scattered orchards of rambutan and homestead trees at Bali and the other Eastern Indonesian islands (Nusa Tenggara province). The production value of Rambutan is small as compared with other Indonesian fruit crops.

Rambutan needs a dry spell of about 2 to 3 months to induce flowering. Recommended cultivars such as 'Rapiah', 'Lebak Bulus', 'Binjai' and 'Garuda' have been described by the Directorate of Fruit Crops (DG Hort. Production).

Some key figures of the rambutan sector in Indonesia (2001 - 2006) are presented below:

Year Feature	2001	2002	2004	2006
Total production (MT)	350,875	476,941	709,857	801,077
Area under production (ha)	63,463	69,071	80,485	81,824
Average production per hectare (MT/ ha)	5.5	6.9	8.8	9.8

Table 3.3: Key figures of the Indonesia rambutan sector

Island / province	Area (ha)	Yield per ha (MT)	Production (* 1000 MT)
Sumatra	21,068	9.0	189,388
Java	41,573	10.7	455,046
Bali plus Nusa Tenggara	3,704	6.4	23,837
Kalimantan	8,778	11.3	99,174
Sulawesi	6,003	5.9	35,368
Total Indonesia	81,824	9.8	801,077

*Table 3.4: Production of rambutan in Indonesia, 2006 (production figures * 1000 ton)*

The most advanced production area is Kabupaten Subang, West Java, Commercial orchards are found in Subang but a large share of the production still takes place at small-scale homestead gardens with a small numbers of trees per farmer.

The Directorate of Fruit Crops has developed a set of standard operational procedures for rambutan that will be introduced with the growers in the next couple of years. In combination with the registration of farmers and his trees, this is a first step towards certified rambutan for export and high quality domestic markets.

At the international (export) market, the major competitor of Indonesia is Thailand, which has a well-developed rambutan sector. Thailand has cold storage and packaging facilities in place in the major production centres contributing to a better quality of the rambutan. Production in Thailand takes place in professional orchards with about 100 – 250 trees per hectare. A distinct feature of the Thai rambutan sector as compared with Indonesia is the presence of a mature canning industry. Processed rambutan canned in syrup, pure or mixed with pineapple chunks is popular with consumers. In 2001 Thailand exported for 50 million US$ fresh rambutan fruits and 428 million US$ canned rambutan.

Rambutan production in Indonesia 2006 (* 1000 MT)

*Table 3.5: Production of rambutan in Indonesia, 2006 (production figures * 1000 ton)*

3.2.3. Quick supply chain scan and analyses of major marketing channels 6

Selected producers, traders, service providers and government officials in the major production centre in West Java were interviewed individually and in groups. Jakarta and Bandung based traders (3 x) were interviewed and their facilities were explored. The Jakarta wholesale market (Kramat Jati) was visited to inspect the product quality on the spot. Additionally some wet and retail markets were inspected.

Production and cultural practices

In spite of its huge production area of about 80,000, ha rambutan is still a smallholder based production sector. Only a small portion of the total volume is produced in professional orchards of more than 1 hectare. A modern rambutan production site of 5 hectare was visited in Subang; however, it appeared that this holding consisted of five different plots of 0.5 – 1 hectare each.

[6] *For the description and analysis of the rambutan sector we used interviews and observations made in Kabupaten Subang, West Java.*

Production is 50 kg / tree during the early phases of tree establishment (year 3 – 6) and increases until 200 kg / tree when mature. With an average planting distance of 10 – 12 meters square (60 trees per hectare) a professional orchard can produce about 12 ton per hectare per year. Although rambutan can be grown with a minimum of cultural practices, some treatments that are recommended and sometimes practiced by professional growers are:

- Pruning after harvest, removing all dead and old branches, rejuvenating the tree and allowing light inside the canopy.
- Fertilization, complete fertilizer and farmyard manure application.
- Intercropping with melinjo (Gnetum gnemon) is common practice during the early years of orchard establishment.
- Rambutan is suitable for honey production and honeybees (hives) are placed in the orchard for better pollination and honey production during the flowering season in July.

These cultural practices make sense in commercial orchards. Whereas the qualitative and yields of the trees in homesteads and along side the roads is much lower anyway it is also not economically feasible to apply these measures in homesteads. The extra costs are often not recovered by higher prices per kg or higher production volumes.
Artificial flower induction by applying water after a dry spell is not practiced in Indonesia. Irrigation furrows are present in some orchards but farmers explained this was merely to divert excess rainwater.

Currently the DG Fruit Crops is advocating the use of grafting selected varieties on old trees ('top working') to change cultivars and to modernize the sector. Young, grafted young trees are also available at the market but it is not known whether farmers produce their own seedlings or buy them at the market. In general, there is hardly any specialisation in the sector and specialised nurseries were not observed during this survey.
Some orchards were registered according to the SPO guidelines for rambutan of the DG Fruit Crops. These guidelines are however only relevant for rambutan grown in orchards. Growers complain that the implementation of these SPO's costs them time and money and does not result in extra income.

Harvest, post harvest practices and quality
The majority of the growers – even in Kabupaten Subang – own 10 – 20 trees and they sell the fruits directly after harvest to a local collector. Small traders send truckloads (pick up trucks) of ungraded rambutan to larger traders cum collectors in the cities. The trader and his staff do the actual grading process and packaging in his pack house.
Grading and quality standards have been developed by the Directorate Fruit Crops but these standards are mostly not abided by. It was observed that some traders put a sticker (star / "bintang") on the fruits and boxes of the highest quality. The local variety 'Binjai' that is grown in Subang is appreciated by the market. There appear to be no firm / fixed contracts between traders and growers in place. Producers mostly take care of the picking themselves.
A major post harvest problem is the quality of the hairs. Water losses of the rambutan due to its large and hairy surface are responsible for a loss in quality. This problem is aggravated by the absence of cold storage facilities and in adequate transport and packaging conditions.
For certain export destinations such as the South Korea market a minimum Brix [7] value of 15 should be achieved. Unfortunately, rambutan exports to Korea were halted already after the first shipment, according to the respondents.

[7] *Brix value is an indicator for the sweetness of fruits (sugar / acid ratio)*

Trade and marketing

During the season at least two-truck loads rambutan per day (total 20 ton / day) are sent from Subang to the major markets in Jakarta, About 10 collectors / traders are active in Kabupaten Subang and they operate and buy fruits on behalf of a trader in Jakarta or Bandung. Collectors / regional traders move from place to place following the production season of the fruits.

In the low season, good quality fresh rambutan fetches IDR[8] 5,000 / kg whereas prices can drop as low as IDR 1,000 – 1,500 per kg during the peak season.

Collectors pay more for a better quality rambutan which is defined by colour, size, quality of the hairs and freshness / appearance of the fruits. There are also preference varieties.

Some traders for export do packaging in trays of 250 grams for export to the Middle East. Trays are shrink foil wrapped to avoid drying out of the fruits. In the nineties, there was some of export to Europe (France, Netherlands and UK) via a Dutch importer. However, this export has almost stopped completely. Packaging is mostly done under non-certified and non air-conditioned circumstances.

Major markets for rambutan produced in Kabupaten Subang are Semarang, Bandung, Jakarta and Surabaya. There seems to be some competition of high quality fruits from Bali. However most of the threat for the rambutan sector come from inside and is caused by the huge over supply of fruits during the peak months of the harvest period December – January.

There is no large scale processing of rambutan at Java. It was reported that the only factory processing rambutan - sometimes in combination with pineapple - is PT. Agrosari Sentraprima in North Sumatra.

Development options

All respondents expressed their concern that the rambutan sector comes under pressure because of competing claims for their land. Orchards are close to the city of Subang and there is need for land for industrial development. Higher prices of inputs such as fertilizer and other chemicals and rising costs of transportation further undermine the profitability of rambutan production.

We discussed possible strategies to increase the profitability and competiveness of rambutan production. Farmers continually look into new markets to fetch better prices. We concluded that it could be useful to investigate the market for processed rambutan and to execute a feasibility study for industrial or village based processing of rambutan (canning or freezing).

[8] *1 Euro = IDR 14,100 (June 2008)*

3.3. Avocado

The avocado (*Persea americana Mill.)* is found all over the world and is produced in at least 57 countries. The fruit is becoming more popular in the EU and the USA where imports have significantly increased over the last couple of years.
The following types of avocado are distinguished: the West Indian type (WI), the Mexican type (MX) and the Guatemala type (G). A very important variety on the world market is 'Hass which is considered to be a hybrid of the G-MX types. The Hass variety is more or less a standard on the world market. The appearance of the fruits is ridged with a colour pattern from green to black depending to the stage of ripening. USA and European consumers prefer the 'Hass' avocado. On some other markets in South East Asia like Taiwan and Singapore a more smooth type of avocado is preferred.

Avocado has a long life cycle (longevity and productive period). Young trees produce 10 to 20 kg per tree, and stabilize their production at 10-15 years of age. The maximum production of a tree is usually reached at 15 years of age. Some types of avocado grown under favorable conditions grow indefinitely. Avocado can produce fruit all year-round. The yield of fruit per tree varies due to the avocado type, cultivation, and zone. An adult orchard typically stabilizes its production from 80 to 100 kg of fruit per tree per year. The yield is indeed influenced by the age and the tree density within an orchard.

The avocado fruit is a climacteric fruit with regard to ethylene production after harvest and ethylene sensitivity depending to stage of ripening. Avocados can be left on the tree for months after the fruits are physiologically mature and fruits will only ripen if harvested. However, time-to-ripen does decrease with increasing time on the tree. Freshly harvested avocados tend to have "green" skins although 'Hass' fruit that are harvested late in the season may have some skin darkening at harvest. The peel of ripe 'Hass' and 'Lamb Hass' avocados should have a dark, purple-black or black skin while green-skinned cultivars remain green when ripe. Avocados are ripe when the fruit yields slightly to light finger pressure. Pulp color, texture and flavor when ripe are cultivar-specific.

Major quality criteria of avocado are size, skin colour, absence of wounds and insect damage, spray residues and other contaminants on the skin. When ripe, key issues are absence of diseases (body rot and stem end rots), no physiological disorders (flesh graying) and absence of physical damage (bruising). Many of these quality factors are cultivar-dependent.

Avocados are one of the few fruit that contain significant quantities of oil; sometimes > 30% of fresh weight depending on cultivar and maturity. Oil content is a key part of the sensory quality. Oil quality is very similar to that of olive oil with a high proportion of the oil being approximately 75% monounsaturated, 15% saturated and 10% polyunsaturated fatty acids (omega 6).

The response of avocado to storage temperatures varies according to temperature ranges, as follows: in 10 to 25°C the fruit softens faster as storage temperature increases, in 5 to 8°C softening is controlled, in between 0 and 4°C, softening is limited by time, due to the risk of chilling injury. However recommended storage conditions may vary according to the avocado variety Optimum storage conditions vary by cultivar, growing conditions, time in the season (maturity) and length of storage required. In general, unripe avocados should be stored at 5 to 12 ºC with RH of 85 to 95%. Optimum storage temperatures for 'Hass' are 5 to 7 °C for early season fruit and 4 to 5.5 °C for late season fruit. Modified or controlled atmospheres can increase shelf life when combined with controlled storage temperatures. These data were collected and are valid for Mexican circumstances and should be verified for Indonesia because different types of avocados are grown in Asia.

The use of 1-MCP (1-methylcyclopropene) to extend shelf life of avocado is in the experimental stage and should be used with caution. Application of 1-MCP to avocados delay ripening and thus reduces internal chilling injury (flesh graying, vascular browning).

There is an increasing move at the retail level toward "ripe for tonight" programs that generally result in significant increases in sales. This is achieved by treating avocados with 10 to 100 ppm ethylene at 17 to 20 ºC for approximately 48 to 72 (early-season), 24 to 48 (mid-season) or 12 to 24 h (late-season). This significantly reduces both the time to ripen (to 3 to 6 days, depending on cultivar and maturity), and also fruit to fruit variability in ripening.

3.3.1. The global Avocado scene

There are about 57 avocado producing countries in the world. The world wide area on which avocado is grown is about 348,769 ha, producing 2,583,226 tons a year. The average yield per ha is 7.40 tons. The main producing countries in the world are:

Country	% of world production
Mexico	37
U.S.A	8
Colombia	6
Indonesia	5
Dominican Republic	4
Chile	4
Brazil	3
Israel	3

Table 3.6 Avocado producing countries in 2002 (APROAM, 2003)

As it can be seen in Table 3.6, the leading producer in the world is Mexico. Some countries can compete in terms of quality with Mexican produce, such as Chile, Spain, Israel, South Africa, and Dominican Republic. International avocado trade has become more important in the past two decades, and avocado is no longer considered an exotic fruit but part of the everyday diet of many countries. This tendency has been reinforced by the consumers' trend to look for natural and healthy products. Avocado has a large market as a fresh fruit, besides its application in the oil, cosmetic, soap, and shampoo industry. Some avocado is also processed (avocado paste and frozen avocado) and in Indonesia avocado juice is popular.

Year Country	2000 (* 1000 MT)	2002 (* 1000 MT)	2004 (* 1000 MT)
Mexico (1)	907	897	1.040
Indonesia (2)	146	238	270
USA (3)	217	180	200
Brazil (4)	86	174	174
Columbia	132	144	170
Dominican Rep.	82	148	150
Spain	64	107	135
Chile	98	110	135
Total production (world)	2.680	2.998	3.276

*Table 3.7: Production of avocado per country (production figures * 1000 ton)*

Export figures of some countries are presented in table 3.8:

Year / Country	2000 (* 1000 MT)	2002 (* 1000 MT)	2004 (* 1000 MT)
Spain	6	6	12.6
USA	3	2	1.6
Dominican Rep.	12	11	16
Mexico	89	94	105
Chile	52	78	119
Total production (world)	287	355	401

*Table 3.8: Export of avocado per country (production figures * 1000 ton)*

3.3.2. Avocado production in Indonesia

Avocado production in Indonesia totals to about 270,000 ton per year and Indonesia is one of the countries with the biggest production of avocados. Avocado is produced all over Indonesia with major production centres (Garut and Probolinggo) at Java and Sumatra (see table 3.11).

Production month	J	F	M	A	M	J	J	A	S	O	N	D
Indonesia												

Some key figures of the avocado sector in Indonesia (2001 - 2006) are presented below:

Year / Feature	2001	2002	2004	2006
Total production (MT)	141.703	238.182	221.774	239.463
Area under production (ha)	11.237	18.623	15.536	15.629
Average production per hectare (MT/ ha)	12.6	12.8	14.3	15.3

Table 3.9: Key figures of the Indonesia avocado sector

Island / Province	Area (ha)	Yield per ha (MT)	Production (* 1000 MT)
Sumatra	3.163	16.2	51.092
Java	8.404	16.9	141.984
Bali plus Nusa Tenggara	1.757	17.5	30.775
Kalimantan	43	15.4	661
Sulawesi	1.905	6.7	12.803
Maluku and Papua	357	13.5	2.148
Total Indonesia	15.629	15.3	239.463

Table 3.10: Production of avocado in Indonesia, 2006

No data are available about avocado varieties grown in Indonesia

Figure 3.11: Production of avocado in Indonesia, 2006

3.3.3. Quick supply chain scan and analyses of major marketing channels[9]

A quick supply chain scan with traders, growers and exporters of avocado was executed. Two production areas were visited Kabupaten Garut, nearby Bandung (West Java) and Kabupaten Probolinggo, East Java. Orchards were visited, local growers and traders were interviewed, and meetings with government representatives were organized.

Production and cultural practices

In Indonesia avocado is pre dominantly produced at farmers' homesteads. Commercial orchards with a monoculture of avocado are the exception and mixed cultivation with many other fruit tree species in between is common practice. Due to this extensive production system, it is assumed that the production per tree is much lower than what is found in other production countries in the world. The avocado varieties that are grown in Indonesia are unknown. Main characteristics of the fruits are its smooth skin and relatively large size. 'Mentega', which means butter in Bahasa Indonesia, is an indicator for the best local quality and this type of avocado is easy to peel.

The local production system at homesteads causes a lot of variation in the time of ripening, colour, size and quality of the fruits. To harvest fruits from these large trees is also time consuming and crop protection and other cultural practices are difficult to execute and hence not practiced. Avocado is grown without any spraying of pesticides, no fertilization or other advanced cultural practices. Due to the low level of organization of the growers, it is difficult to contact and train them on quality, production and other improvements. Currently the DG Fruit Crops is promoting a planting distance of about 60 trees per hectare but these recommendations as well as the SPOs (Standard Operational Procedures) which are under development, have little value for the homestead grown avocado trees in Garut and Probolinggo.

In the Probolinggo area, the 'Dinas Pertanian' is involved in describing and the registration of special clones of the "mentega" variety. These varieties will be propagated vegetatively by top grafting young seedlings or old trees. Currently the DG Fruit Crops is also re introducing and old, but superior variety under a new name: 'Sindang Reret' through top grafted young trees and top grafting of old trees. Normally avocado trees are not grown on specially selected rootstocks but grafted on a seedling variety.

[9] *Findings and analyses are based on visits to Garut (W. Java) and Probolinggo (E. Java)*

Harvest, post harvest practices and quality
The fruits at these large avocado trees in homesteads are harvested with special baskets to remove the fruits from the tree without bruising and damaging the fruits. An indicator for the start of the harvest is the first fruit drop. However, this harvest system results in a huge variation in size and maturity of the fruits. Avocados ripen in flushes from October / November until March.

In general, growers are not organized in a marketing or production association. Traders often have a relationship with a couple of growers who deliver their produce to the trader / collector. Growers do an initial rough grading at their sites, and the trader does the final grading depending on the destination of the fruits. Traders often complain about damaged and bruised fruits due to poor packaging and tough transport conditions.

Fruits are packed in wooden or plastic boxes of 17 kg with a paper interior. The ideal quality for the supermarket are fruits of about 400 gram each, a smooth green skin, 85-90% ripeness and an expected shelf life (ready to eat) of 5-7 days. In the Garut area, growers and traders generally accept the following quality classes:

Quality class A	Fruits of 350 gram each (3 per kg)	Without stalks. Variety 'Lambau' quality 'mentega' is considered superior
Quality class B	Fruits of 250 gram each (4 per kg)	
Quality class C	Fruits of 150 gram each (7 per kg)	

Although subjective, there is consensus that the avocado quality that is produced in Probolinggo is superior to the fruits originating from Garut. Fruits from Probolinggo have a smooth skin, bright green colour and are without internal fibres.
It was noticed that avocados from the Garut area showed a bigger variation in size, ripening and external quality. Only after severe grading executed at traders' level fruits can be send to the supermarket and the local market.

No cooling facilities are to present in the avocado supply chain to protect fruits from high temperatures and/or to maintain the quality of the fruits and to prolong the shelf life of the products. Open warehouses and sheds are used for grading and packing.

Trade and marketing
In the Garut area variety Lambua, quality 'mentega' is packed in wooden boxes of 25 kg and this quality fetches prices of IDR 7,000.= per kg at the whole sale market. The lower quality classes are packed in plastic bags of 70 kg produce. Prices of IDR 3,500 per kg are paid for non-graded produce In Garut and Probolinggo a group of traders collect the produce from the growers. They pool the produce and sell the avocados at various markets. In Garut, the traders operate a central packaging and grading facility in the house of one of the leading traders who is also the chairman of the traders association.
There is a reasonably developed quality consciousness in Garut and Probolinggo and avocados are paid for according to its colour, variety and age of the fruits (remaining shelf life). The best quality has an ideal shelf life of about 5 days after harvest.

Some avocados are exported to Taiwan, Singapore and Middle East countries (S. Arabia). Traders and exporters were outspoken about the export chances of Indonesian avocado: due to the product variation and lack of uniformity and the different type of avocado (non 'Hass' type) export is almost impossible to the European market and difficult in the region.

Development options

Strategies to enhance the competiveness of avocado production in Garut were discussed with growers, traders and Government officials. It was confirmed times and again that the market is prepared to pay a premium price for the best quality avocado (from Garut or Probolinggo) throughout the season. Traders are quality conscious and they grade according to the quality classes that are most appreciated in the market. Farmers are not always aware of these quality classes and they harvest often too early or at sub optimal moments. Due to the small scale and extensive production system it is almost impossible for exporters and traders to source large quantities of uniform product qua size, ripening status etc. The level and scale of operation of the traders is not sufficient to meet the demands and requirements of modern (super)markets.

In Indonesia two distinct domestic markets are distinguished. Supermarkets (i) who require a reliable, high quality and homogeneous quality and a steady supply.
Traditional 'wet' markets (ii) encompass street hawkers, food stalls at the market and local shops. The lower quality avocados are sold at these traditional markets.

For the short term there is a need to objectively define the quality of avocados and standardize quality. This will make quality visible and it can be communicated within the supply chain.
A long term option for strengthening the supply chain and to increase the competiveness of the Indonesian avocado is 'vertical integration' (to be elaborated in chapter 5 and 6 of this report).

4. Competiveness of Indonesian fruits

4.1. Rambutan

Porter analysis rambutan

To determine the competitiveness of a product or sector Porter takes into account the major production factors and compares two or more countries that produce for the same market. In the case of rambutan, consultants have compared Thailand and Indonesia who produce for the export market e.g. Middle Eastern countries and the EU.

(Production) factor	EU / Middle east export market	
	Thailand	Indonesia
Land	0	0
Labour	0	0
Knowledge	+	-
Air freight rates	+	-
Internal logistics	+	-
Cold chain facilities	+	-
Quality of fruits	+	-
Cost price per kg	+	-
Image / consumers' appreciation	0	0

Legend: *+ = performs significantly better than the other country*
- = performs less as compared with the other country
0 = neutral, no competitive advantages

At the Indonesian, domestic market there is hardly any competition from import fruits as far as it is rambutan concerned. For the time being, the position of the Indonesian Rambutan is un challenged.

SWOT analysis rambutan

S (Strengths)	W (Weaknesses)
• Production season differs from Thailand; complementary	• (Absence of) professional and specialised producers / processors
• Quality according to (domestic) consumer expectations	• Sharp production peak (Dec – Jan); temporary over supply with low prices
• Specific Indonesian (S-E Asian) product	• Poor handling and post harvest practices; poor quality fruits
• Concentrated production areas at Java mainly (some professional orchards)	• Absence of cold chain facilities
• Distance to domestic markets (near)	• Opportunities for certification; absence of certified farms
O (Opportunities)	**T (Threats)**
• Export marketing to selected countries	• Professional Thai processing sector; export canned rambutan to Indonesia
• Processing industry according to Thai model	• Logistical situation; road congestion
• New product development (proceed products)	• Increasing oil prices and transport costs

4.2. Avocado

4.2.1. Export markets

European Union (EU)

On the global market and especially on the EU market the 'Hass' variety is more or less the standard for avocado. Other types are not always appreciated which makes it difficult to enter the EU market with for example an Indonesian type of avocado.

Another hurdle to enter the EU market is the quality and uniformity of the product that are required. Variability in size, ripening stage, colour, taste and sensitivity to diseases should be kept to a minimum for this market. Again, Indonesian produce has certain disadvantages as compared with specialized exporting countries such as Mexico, South Africa, Spain and others

Finally yet importantly fresh products need to be GlobalGAP certified and to date no avocado orchards in Indonesia have been certified. The IndoGAP[10] standard (with Prima levels 1, 2 and 3) is not yet accepted as an equivalent.

In combination with relatively high airfreight rates and the absence of CA containers for sea transport it is virtually impossible for the Indonesian avocado to enter the EU market. Price competition at the EU market with well-organized competitors such as Spain, Mexico and other countries is also stiff

Regional markets

The outlook for Indonesian produce at the regional export market (Singapore, Korea, Taiwan and other countries) and Middle East markets such as S. Arabia looks better. The Indonesian type of avocado is appreciated at these markets and the logistical costs are less. There is already a good number of promising trade prospects. Some of these regional countries are less stringent with their quality and certification requirements. However, competition from Australia and neighbouring countries such as Malaysia and Thailand at these markets is fierce and Indonesia should rapidly catch up with cold chain facilities and certification services.

'……..we can try to convince the rest of the world that they eat the wrong avocado variety and that the Indonesian varieties are superior to the Hass avocado but that is unlikely to be very successful and costly. We better focus on our domestic markets by getting better prices for high quality avocados….' (Excerpt from interview with trader)

In short, position of Indonesian avocado with regard to export markets:

- Specialized and demanding export markets ask for GlobalGAP certified and 'Hass' type avocados.
- Indonesia can only cater for regional niche markets where they prefer the Indonesian type (smooth skinned) of avocado.
- Trader owned and GlobalGAP certified production facilities (vertical integration) as well as HACCP certified packaging and distribution facilities can play an essential role for (satellite) farmers to get access to high quality export markets (out grower model).

4.2.2. Domestic market

The domestic Indonesia market can be distinguished in the traditional wet market that is characterised by low prices and margins and the absence of stringent quality and certification standards.

Although still small but interesting in terms of margins and growth potential is the upcoming retail sector in Indonesia. It is envisaged that the volumes sold through supermarket outlets will increase in the coming years due to a growing middle-income class of people.

There are no constraints for Indonesian produce to cater for the wet markets currently.

[10] *IndoGAP = Indonesian Good Agricultural Practices*

However to stay in business with the retailers the domestic supply chain has to be improved considerable in the near future. It was noticed by consultants that in general the quality of fruits and vegetables at the supermarket shelves is of a lower quality level as compared to supermarkets in other countries. This was also the situation with avocado. It can be expected that retailers will increase their standards as part of their ISO certification programs and this can have a significant impact on the fresh fruits and vegetable sector.

An adequate response of the avocado supply chain is required to stop retailers starting to import avocado instead. It is not desirable that avocados are imported from Australia and Malaysia whereas Indonesia has a huge domestic avocado sector
Economies of scale to cut on logistics and other cost are needed to deliver large and homogenous quantities of a high quality to these modern markets.
The current situation in which dozens of local traders collect produce from hundreds of anonymous growers should change into more fixe and preferred relationships in order to cope with the future demands of retailers. An example of such a rationalized and modern supply chain is in place in Probolinggo already. The Probolinggo based trader has enough avocado of a uniform quality from a fixed group of producers to supply all the outlets of a supermarket organization.

In general, the taste and appearance of the domestic avocado meet the expectations of the Indonesian consumer. There is a strong preference for the 'Mentega (butter)' type of avocado as produced in Kabupaten Garut and Probolinggo. Nowadays avocado produced for the domestic market faces hardly any competition. Import of avocado is insignificant and there is a good demand for fresh avocado all over Indonesia. Avocado is consumed fresh, in salads or it is used for juices ('Juice Alpukat', a kind of a shake made from avocado which is quite popular in Indonesia)

In short, position of avocado with regard to the domestic market:

- Traditional sourcing methods (spot buying and local collection points) prevail in Indonesia.
- There is a shortage of high quality avocado in the market and regional qualities, in particular from Probolinggo and Garut, are appreciated and requested by consumers.
- No special certificates are required for domestic markets yet but the market requirements are likely to increase in the near future.
- There will be a gradual transition to traders buying avocado from preferred suppliers / producers to respond to these market requirements;
- There is price differentiation according to quality classes, maturity and colour and shape of avocado.
- Quality grading of avocado could results in better financial results for all parties.

The SWOT analysis of avocado (all markets) reveals the following:

S (Strengths)	W (Weaknesses)
• Smooth varieties optimal for domestic market and regional export	• (lack of) knowledge & entrepreneurship
• Regional avocado qualities (Garut and Probolingo) are well appreciated and paid for at local markets	• Indonesian smooth skin varieties are not suitable for EU and other major export markets (Hass avocado type)
• Substantial domestic juice and milkshake market in	• (Absence of) supply chain facilities & organization (e.g. no cold chain fac.)
	• Fragmented and small scale production sector; no orchards
	• (absence of) service providers
	• Product variability and post harvest losses and handling
	• (Absence of) professional and specialised producers
	• Opportunities for certification; absence of certified farms
	• Logistical costs
O (Opportunities)	**T (Threats)**
• Niche (export) markets for local smooth variety	• Global competition
• Regional branding	• Logistical situation; road congestion
• Improving product quality (Quality and price related grading)	• Increasing oil prices and transport costs

4.3. Baby mango

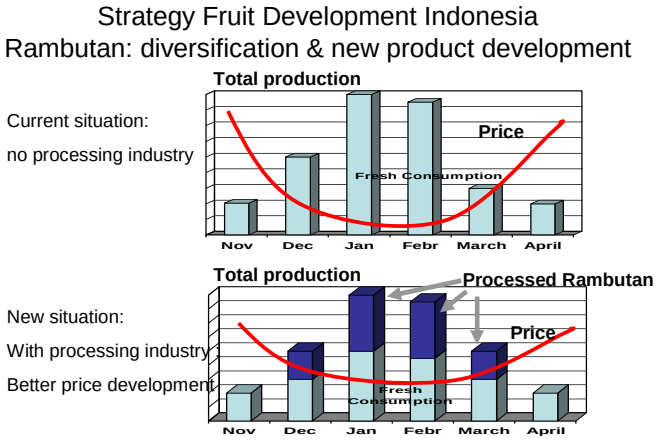
Although not included in the terms of reference, consultants noticed a very fine quality baby or mini mango (variety Gedong Ginci, about 200 gram per fruit, round – kidney shaped, yellow skin) in the market. Trough the eyes of the modern, western consumer this mini mango could be an attractive product.

Consultants see opportunities for a pre packed mini mango on the retail shelves. Small fruits and mini vegetables fit in the trend towards one-portion fruits (tommies, mini cucumbers, berry kiwi etc.) Consumers sometimes complain that the current mangoes are too big and sometimes not sweet enough.

Indonesian traders and retailers are also positive about the mini mango and there seems to be a shortage of supply. One trader told us "…why to go through the entire hassle and export min mango whereas I also can fetch a good price at the domestic market…."

5. Strategy

5.1. Rambutan – New product development; processed rambutan



Based on the SWOT analysis and the Porter analysis as presented in the previous paragraph the mission is the opinion that export marketing of rambutan is not a viable strategy for Indonesian rambutan. In addition, advanced strategies to increase the competiveness of a sector, which are applied elsewhere, are unlikely to be successful in Indonesia under the current circumstances. Consultants have considered strategies such as early and late ripening varieties to extend the production season, controlling the flowering of the trees by water stress and chemicals; controlled and modified storage facilities and vertical chain integration to control quality.

To improve the competitiveness of the Indonesian Rambutan sector stakeholders raised the option to develop new product market combinations and novel marketing channels. In particular, we discussed the opportunities for canning, freezing and other methods of processing of rambutan. The rationale to move into new product market combinations (PMCs) is that:

- There are two main producing countries of rambutan in South East Asia: Thailand and Indonesia with complementary, non-overlapping production seasons. Thailand has a well-developed industry with many competitive advantages as compared with Indonesia. It is unlikely that Indonesia can beat Thailand at export markets in the next couple of years.
- Rambutan is a seasonal product and prices drop sharply during the peak production and harvest season in Indonesia (December and January). These low prices undermine the profitability and results of professional growers in particular. Homestead producers are used to these price fluctuations and have lower costs of production.
- The profitability of the sector and income generated per tree / hectare should be increased urgently in order to professionalize the sector in the end.
- Processing part of the total production in the mean production centres during the peak season could provide an alternative outlet for professional as well as homestead producers. Processing could also help to keep the prices at a more acceptable level.
- It was learnt from Thailand that the export of canned rambutan could be a lucrative market, also making the rambutan sector more robust. The Thai processing industry provides an alternative outlet for farmers for some months of the year. Thailand export 10 times more canned than fresh rambutan. This has been observed in other countries with a huge production of perishable products such as mushrooms, strawberries etc. In those cases, processing can help to a certain extent to stabilize prices in periods of over supply.

- To date there is no professional processing sector (frozen, canned or pulp) for rambutan in Indonesia.

Recommendation 1
Rambutan new product development; processed rambutan

To professionalise the Rambutan sector and to provide an alternative market for growers processing of rambutan could offer a market alternative. A feasibility study is recommended to explore opportunities for industrial or village based processing (canning, freezing etc) of rambutan.

5.2. Avocado – Quality grading and vertical integration

It was observed and reported that the domestic production sector of avocado faces difficulties to supply the export market but also the local market with homogeneous and high quality avocados. Reasons are the prevailing production system (homesteads mainly), the in transparent supply chain cum trading system and poor communication about quality and grades. It is envisaged that the domestic demand (including supermarkets) for high quality avocado will increase in the coming years. There is an imminent danger that retailers will import avocado from abroad (Australia for example) to satisfy their demand for a consistent quality and regular supply at affordable prices which is not wanted.

On the long term, the Indonesian sector could react to these development through vertical chain integration (shortening the supply chain), improving cultural, and post harvest practices. In the medium to long run traders should also have HACCP certified packaging facilities, cold storage rooms to provide the market with high quality avocados. It is also foreseen that traders will operate their own production sites and a network of preferred and dedicated growers in the future. This process will have a positive effect on the overall sector. Working with local, satellite growers has several advantages but equally important is that the farmers can deliver their product through the traders' facilities and his quality management system. Hence, growers will get access to knowledge and trained in professional production methods to improve quality and fetch better prices. A higher price for a better quality avocado could be a trigger for local growers to invest more in improved cultural practices.

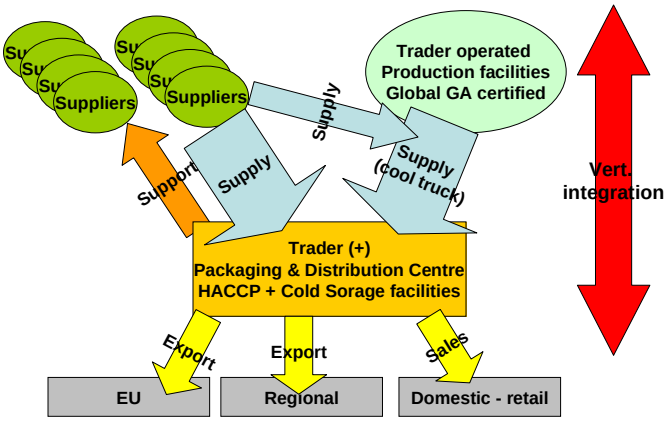
An effective short to medium term strategy to get better prices and to earn more with avocado production and marketing could be quality grading (i) and region branding (ii). There are some distinct quality classes recognized by the market and consumers are prepared to pay more for a high quality 'mentega' avocado of 350 gram with a shelf life of 4 days. It was therefore discussed with stakeholder that there is a need to turn this quality into a local standard and to communicate this standard with photos and descriptions throughout the supply chain and to the market. A brand name or indicator that the avocado originates from Garut or Probolinggo could also help to increase consumers' satisfaction and to fetch better prices.

Recommendation 2
Avocado: quality grading and vertical integration

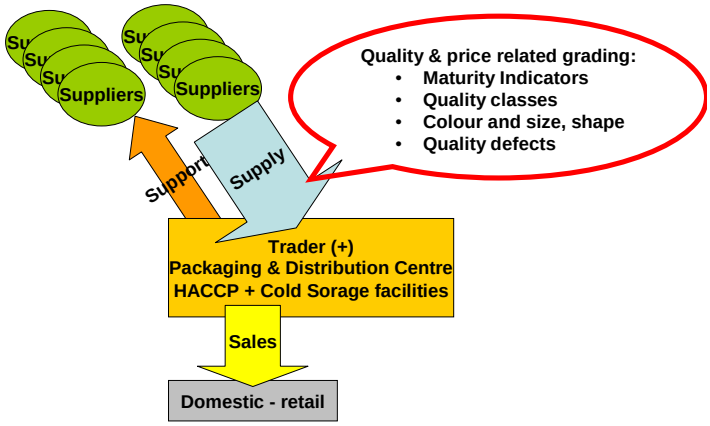
Long term strategy:
An approach of vertical integration (shortening) of the supply chain can eventually lead to an improved quality of avocados and farmers being able to meet domestic supermarkets' demand for improved and uniform quality. This strategy will also boost regional export of the Indonesian avocado.

Short term strategy:
For the short term it useful to make quality visible in the supply chain and develop a standardized quality standard. When supply chain partners agree upon this objective quality standard this enables them to communicate within the chain in order to get *a better price for a better quality.*

Long term strategy fruit development Indonesia
Avocado: vertical integration



Short term strategy fruit development Indonesia
Avocado: focus on quality for domestic market



6. Action plans and follow up

6.1. Rambutan; feasibility of processing of rambutan in Indonesia

Project brief / Terms of Reference

Introduction
Rambutan is a highly seasonal product and prices drop sharply during the peak production and harvest season in Indonesia (December and January). These low prices undermine the profitability and results of professional growers in particular. There is a need to increase the profitability of the rambutan sector to professionalize the sector in the long term. Processing rambutan during the peak season might provide an alternative outlet for professional as well as homestead producers and could help to keep prices at a more acceptable level. It is learnt from Thailand that the export of canned rambutan is a profitable market; the Thai processing industry provides an alternative outlet for farmers for some months of the year and Thailand export 10 times more canned than fresh rambutan. To professionalise the Indonesian rambutan sector and to provide an alternative market, processing (at industrial scale or at village level) could offer new marketing opportunities.

Purpose:
To execute a feasibility study and explore the economic viability of establishing a processing factory or initiate village based small scale processing of rambutan. Options are:
1. New and specialised factory for rambutan, processing other fruit products during the rest of the year;
2. Using spare canning and processing capacity of existing factories in Cirebon and Semarang;
3. Village based, small scale processing of rambutan.

Aspects of this feasibility study are logistics and organization; partner identification; lessons learnt from the Thai canning industry; market survey and prices and making smart combinations with mixing rambutan and other canned fruits (pine apple). Depending on the answers on the previous question, a business plan will be drafted.

Proposed activities:
- Literature survey, interviewing and internet search on aspects of the Thai processing industry; lessons learnt.
- Survey into the canning and processing industry for fruits in Indonesia;
- Assessment of prices - supply relationships in Indonesia (optional).
- Opportunities for new product development and technical feasibility of processing Indonesian Rambutan; pulp, frozen or canned products and process design;
- Partner identification to establish a processing factory and feasibility for rambutan
- Organization of product supply for processing industry.
- Business plan for processing factory and/or for village based processing.

Results:
- Feasibility report and business plan for setting up canning factory / canning production line within existing factory;
- Partners identified to implement the business plan.

Implementation:
Institute for Processing fruits and vegetables, Indonesia (Medan), DG Horticultural Fruit Crops and DG Processing and Marketing (DG Pengolahan Pemasaran), Wageningen UR

6.2. Avocado: Quality grading

Project brief / Terms of Reference

Introduction
Indonesia is one of the biggest producers of avocados in the world. The production season is from November until March. Despite its favourable climate and soil conditions and production potential, Indonesian avocados are not very much appreciated at the global market due to the different type of avocado and the quality.
At the domestic market the indigenous Indonesian avocado, in particular fruits from Probolinggo and from Garut are very much appreciated, but the sector faces problems to regularly supply a consistent quality avocado to modern markets. Summarizing there is an imminent danger that retailers will import avocado from abroad to satisfy their needs in the future.

Within the avocado supply chain there is awareness of quality but quality classes are flexible and vary with the season and area. There is a need to standardize and fix at least some quality classes thus ensuring the quality and the origin of the fruits. Quality can be standardized in terms of quality, size, colour and ripeness. Such a standard could also be helpful to communicate quality in the supply chain and make trade agreements easier and more transparent.
It could also result in a better balance between supply and demand; for example, retailers can demand for a particular, well-described quality with traders. Nowadays retailers need to accept more or less the quality that is offered by traders in a particular season.

This process of raising quality awareness should be accompanied by capacity building on product handling at harvest, improved packaging, transport, cooling and grading. These are important measures to maintain the quality of avocado in the supply chain.

Purpose of pilot:
To develop an objective and clear-cut system describing the quality of avocados for communication in the supply chain, accompanied by the introduction of cultural and post harvest practices to improve product quality.

Proposed activities and results
- Interviews with different supply chain partners, including consumers and retailers to define quality.
- (Literature) survey on quality standards for avocado and accompanying measures to maintain quality; translation into Indonesian circumstances.
- Develop a protocol with a focus on product quality – supplementary to the SPO of DG Horticultural Production (fruit crops) – for Indonesian avocado types with regard to quality, maturity indexes, colour, size, quality improvements and certification.

Implementation:
Wageningen UR, DG Horticultural Production (Fruit Crops), DINAS Pertanian Probolinggo and Garut, DG Processing and Marketing

7. Sources of Information

General

--, 2004. Quick Country Scan Indonesia and Malaysia
WageningenUR, internal publication.

-- , 2007. Horticultural Producers and supermarket developments in Indonesia,
Report no 38543 – ID, World Bank

-- , 2008. Expor Buah ke Uni Europa
FRUIT Export Development Centre,(FEDC) Indonesia, internal publication

--, 2008. Proceedings of the SWOT workshop on mango and mangosteen
ACIAR, internal publication

--, 2008. Worlds Fruit production by country 2007
FAO Statistical Database

--, 2008. Statistik Produksi Tanaman Buah Buahan.
Directorate Budidaya Tanaman Buah. Internal publication

Amhad, I. and C.P. Chwee, 2008. An overview of the world production and marketing of tropical and subtropical fruit.
In: N. Chmchalow (ed) Proceedings IW on TSF, Acta Horticultura 787, ISHS

Kuntarsih, S et al. 2006. Assessment of Banana supply to Cengkareng Wholesale market, Banten, Indonesia
In: Proceedings 1st IS on supply chains in transitional economies.
P.J. Batt (ed), Acta Horticultura 699

Morey, Philip, 2007. Indonesian Fruit importers face up to new market challenges.
In: Asia Fruit magazine, Sept/Oct 2007.

Morey, Philip, 2007. One stop shopping drives modern retail gains.
In: Asia Fruit magazine, Sept/Oct 2007.

Morey, Philip, 2007. Horticultural exporters face range of challenges.
In: Asia Fruit magazine, Sept/Oct 2007.

Morey, Philip, 2007. EKONID launches new fruit export development centre.
In: Asia Fruit magazine, Sept/Oct 2007.

Morey, Philip, 2007. MASINDO tackles export opportunities and challenges.
In: Asia Fruit magazine, Sept/Oct 2007.

Morey, Philip, 2008. Indonesia eyes export development.
In: Asia Fruit magazine, Jan/Febr 2008.

Stallen, 2003. Prospects of tropical fruit trade to Europe.
In: Proceedings of 1st Tropical Fruit Seminar, Bali.
Internal report DG Horticultural production, Indonesia.

Tukan, J.C. et al, 2006. Market Chain Improvement. Linking farmers to markets in Nanggung, West java, Indonesia.

In: Proceedings 1st IS on supply chains in transitional economies.
P.J. Batt (ed), Acta Horticultura 699.

Rambutan

-- , 2005. Standar Procedur Operational Rambutan
Dir. Budidaya Tanaman Buah. Internal publication.

-- , 2006. Vademekum Rambutan
Dir. Budidaya Tanaman Buah. Internal publication.

--, 2008. Informasi mengenai ekspor rambutan.
Internal publication DG Horticultural production, Indonesia.

Baker, Ian, 2008. The potential for rambutan in Eastern Indonesia
SADI-ACIAR internal research report .

Ketsa, Saichol and Robert E. Paull, 2004. Rambutan
In: Fresh Produce Manual, Agriculture Handbook Number 66 of the Produce Marketing Association, University of California.

Kruger, F.J. and A.B. Truter 2003. Relationship between Pre harvest Quality Determining Factors and Controlled Atmosphere Storage in South African Export Avocados.
In: Proc. 8th Int. CA Conference, Acta Hort 600, ISHS

Poerwanto, R., 2005. Rambutan and Longan production in Indonesia.
In: Proceedings 2nd IS on lychee, longan, rambutan and other tropical fruits.
N. Chomchalow and N. Sukhvibul (eds). Acta Hort. 665, ISHS

Medlicott, A., 2008. Postharvest Handling of Rambutan,
Agribusiness online.

Salakpetch, S., 2005. Rambutan Production in Thailand
In: Proceedings 2nd IS on lychee, longan, rambutan and other tropical fruits.
N. Chomchalow and N. Sukhvibul (eds). Acta Hort. 665, ISHS.

Welzen, P.C. van, E.W.M. Verheij, 1991. Rambutan
In: E.W.M. Verheij and R.E. Coronel (eds). Edible fruits and nuts. PROSEA 2.

Avocado

--, 2006. Avocado situation and outlook for selected countries.
In: World Horticultural Trade and US export opportunities.
Internal publication USDA.

--, 2008. Standar Operational Procedur Alpukat
Internal publication Directorate Budidaya Tanaman Buah, Indonesia

Blumenfield, A. Avocado ripening and ethylene biosynthesis.

Dorantes, L., et all 2004. Avocado: Post-Harvest Operations
Internal report, FAO Rome.

Everett, K.R. 1997 Postharvest diseases of avocados,

HortResearch, The Puke, New Zealand, Internal publication.

Harjadi, Setyadi Sri, 2000. Avocado production in Indonesia.
In: Avocado production in Asia and the Pacific. FAO Report 2000/09, Bangkok.

Hopkirk, G. et all 1994. Influence of postharvest temperatures and the rate of fruit Ripening on internal postharvest rots and disorders of New Zealand 'Hass' avocado fruit.
In: New Zealand Journal of Crop and Horticultural Science.

Thompson, A.K. 1996, Postharvest Technology of fruits and vegetables.
Chapter Storage life of Fruits and Vegetables.

Toerien, Jan, 1999. Overview of the world avocado production.
In: Proceedings IV World Avocado Congress. Internal communication.

Whiley, A.W. 1991. Persea americana Mill.
In: E.W.M. Verheij and R.E. Coronel (eds). Edible fruits and nuts. PROSEA 2.

Wijk, S. v., 2007. Presentation Asia Fruit Logistika
Internal communication Fresh Studio Innovations Asia.

Woolf, A. B et all. 2004. Avocado.
In: Fresh Produce Manual, Agriculture Handbook Number 66 of the Produce Marketing Association, University of California.

Annexes

I. Itinerary and persons met

Travel and visit itinerary HORTIN FRUIT mission		
Date and time	**Meeting /visit**	
Sunday June 15		
	Marcel and Iskander to finalize all arrangements and transport	
19.00	Arrival Alex van Schaik	
Monday June 16		
09.00	Meeting Bpk. A. Dimyati and Bpk Wini D Wibawa (Jl AUP, Pasar Minggu)	
11.00	Familiarization with program Directorate Fruit Crops	
13.00	INA / HPSP program on fruit cops; Bpk Haryadi	
16.00	Store visits (Carrefour and Matahari)	
Tuesday June 17		
08.00	Visit to Distribution Centre and facilities UD. Berkah Jaya, Kramat Jati (Bapak Nur Hidayat)	
10.00	Wholesale market Kramat Jati	
12.00	Travel to Subang	
14.00	Subang orchards Rambutan and growers meeting (Subang, Kalijati, Purwadadi)	
17.30	Dinas Pertanian Subang	
21.30	Meeting with Man. Director PT. Alamanda Sejati Utma, Bpk Komar, Bandung	
Wednesday June 18		
10.00	Visit of DC and facilities PT. Alamanda Sejati Utama, Jl. Raya Banjaran No. 468, Bandung	
	Departure (two teams)	
Whole day	**Team Avocado 1**	**Team Avocado 2**
	Marcel / Samsuardi, Garut	Alex / Iskander, Probolinggo
	SC survey: Production sites; ripening rooms; packing houses, local wholesalers etc	
Thursday June 19		
Whole day	**Team 1**	**Team 2**
	Marcel / Samsuardi, Jakarta	Alex / Iskander, Probolinggo
9.00	DG Horticulture; data collection	Dinas Pertanian Probolinggo: Data collection
10.30	PT Masindo, Bpk Salim Ali and Mushtofa Salim	Travel to Production Centre at Tiris - Interview avocado's trader and growers - Visit to storage facilities, - Visit to avocado's orchards
15.00	Fruit Export Development Centre	Departure to Surabaya
Friday June 20		
8.00	Discussion and exchange of ideas and priority setting	

Travel and visit itinerary HORTIN FRUIT mission	
Date and time	**Meeting /visit**
	(Iskander, Alex and Marcel)
15.00	Departure Alex van Schaik
Saturday June 21	
Morning & afternoon	Reporting
Sunday June 22	
Morning	Reporting (Iskander and Marcel)
Afternoon	Departure Marcel for Bangkok

II. Checklists traders, producers and retailers

Checklist avocado / rambutan traders / middlemen	
1. Background information	a. Location b. Years in business c. Type commodities traded d. Other activities / part time or full time trader e. Number of employees
2. Volumes and production (sourcing) areas	a. Volumes of rambutan / avocado purchased per week and month and seasonality b. Volumes of avocado / rambutan purchased per year c. Areas from which rambutan / avocado is purchased d. Relative importance of different production areas e. Differences between production areas with respect to quality f. Advantages and disadvantages of various production areas g. Type of rambutan / avocado purchased h. Preferences for particular varieties i. Differences between varieties (avocado or rambutan) with respect to quality j. Major trends and changes in traded volumes and sourcing areas (over past 5 years)
3. Suppliers / producers	a. Who are your suppliers (farmers, collectors etc) b. Relative importance of different suppliers according to volumes and regularity of supply c. Differences between suppliers with regard to quality and varieties d. Advantages and disadvantages of various suppliers
4. Buyers	a. Who are the buyers of your avocado / rambutan (traders, retailers and consumers) and their locations b. Relative importance (in terms of volume and frequency of purchasing) of different buyers c. Product requirements of different buyers (volumes, quality, packaging etc) d. Advantages and disadvantages of different buyers
5. Prices	a. Current purchasing prices for avocado / rambutan b. Current selling price for avocado / rambutan c. Factors influencing the current prices (buying and selling) d. price fluctuations within the season and reasons e. price fluctuations between seasons and reasons

Checklist avocado / rambutan traders / middlemen	
	f. Price trends over say the past three years and key factors influencing prices g. Expectations for future price trends and driving forces
6. Transactions	a. Place of purchase (farm gate, village, own store, market….) b. Places of sale c. Use of buying agents d. Payment procedures for selling and buying (cash, barter etc) e. Terms and conditions for selling and buying f. Negotiating process with suppliers and buyers (who determines price and conditions) g. Relation ship between buyers and suppliers (regularity, contracts, credit etc)
7. Post harvest activities	a. Harvesting practices b. Packaging practices c. Storage (type of and period etc) d. Sorting and grading procedures and why e. Indication of post harvest losses
8. Support services	a. Means of transport, ownership of transport vehicles b. Market information (sources, reliability etc) c. Credit (sources, relative importance etc) d. Harvesting e. Other support services (transport, certification etc)
9. Marketing costs and risks	a. Main marketing costs (labour, transport, credit, communication etc) b. Major marketing risks (losses, availability, quality, contracts etc)
10. Policies and regulations	a. Key policies and regulations affecting the trading business (registration, licences b. Impact of regulations and policies on your business c. Recommended changes in policies and regulations
11. Key constraints & opportunities	a. Key constraints to further development of the avocado / rambutan trading business b. Possible solutions for these problems / obstacles c. Key opportunities to develop the Avocado / rambutan trading business

Checklist avocado / rambutan producers	
1. Production and 2. Cultural Practices	a Recent changes in local production systems (say over the past 5 years) re: cultivated areas, varieties, fertiliser use, yields, b Production volumes c Cultivated areas, soil types, technologies, yields and production d Types of soil and land where avocado / rambutan is cultivated e Avocado / rambutan land use (mono-cropping, inter-cropping, sequencing of crops f Varieties planted g Assessment of different varieties re: yield, resistance to pests and diseases, input requirements, taste, price, etc h Use of external inputs and cost for e.g. seedlings, inorganic fertiliser, labour i Seasonality in production re: land preparation, planting, mature to give fruit, fertilisation, harvest, etc)
3. Post Harvest	a Harvesting practices re: Equipment, method b Cleaning practices c Storing practices d Reasons for storing avocado / rambutan if any e Post-harvest losses. Re: share of production and reasons f Transportation
4. Marketing	a Timing of farmer sales and reasons b Type of avocado / rambutan buyers and their relative importance c Advantages and disadvantages of different type of buyers d Places of sale (farm-gate, village market, commune market, district market, collection centre) and their relative importance e Advantages and disadvantages of different sale locations f Incidence of group selling g Negotiation process re: who decides the price and why h Selling arrangements re: cash or barter basis, prompt or delayed payment, contracts, etc i Buyer requirements re: product quality, size, maturity, volumes, place of delivery, homogeneous of produce etc j Embedded service provision by buyers re: market information, credit, inputs, technical assistance, contracts, etc k Major changes in marketing (say over the past 5 years) re: buyers, place of sale, selling arrangements, etc

Checklist avocado / rambutan producers	
5. Prices	a Current avocado selling prices re: at farm-gate/village, commune and district level b Differences in price due to variety, c Degree of price volatility within seasons and between years d Price trends (say over the past 3 years) and key factors behind price trends e Perception of future price trends (say over the next 3 years) and key driving factors
6. Service	a Input supply re: sources, quality and affordability of inputs, problems, etc b Market information re: sources, c Technical advice on production, post-harvest and marketing re: sources, reliability, problems, etc d Transport re: availability, cost, problems, etc e Finance re: sources, cost, problems, etc f Other services
7. Constraints, problems and opportunities	Key problems and constraints in avocado / rambutan production

III. Terms of Reference Fruit Supply Chain Mission

Background

The Indonesian authorities have expressed the wish to include fruit production and fruit supply chains in the HORTIN-II programme. The competitive position of Indonesian fruits on the world market is not strong, a.o. because of the fragmented structure of the fruit sector and the absence of treatment and cool store facilities. The objective of the mission will be to assess the Indonesian fruit supply chain in comparison with neighboring countries like Malaysia, Vietnam, The Philippines, China and Thailand. Comparisons will be made regarding supply chain organisation , transportation and handling costs, but also on fruit quality behavior and requirements in relation to transport method and time in transit. This comparison must lead to exploring the potentials for import substitution by domestic fruit supply chains of potential for regional and international exports. The mission should come up with recommendations for improvements in two potentially successful pilot fruit supply chains.

Purpose

The objectives of the Fruit Supply Chain Mission are:

- To conduct an assessment of Indonesian fruit supply chains in comparison with neighboring countries.
- To identify potential niche markets for Indonesian products.
- To identify two potentially successful domestic or international fruit supply chains.
- To formulate a strategy and action plan for improvements for these two fruit supply chains.

Approach

- Review of reports and literature on Indonesian and Southeast Asian domestic and international fruit supply chains.
- Identify weaknesses and opportunities in fruit supply chains for domestic and export markets by interviewing parties involved.
- Selection of two supply chains with high potential
- Identify private partners, retailers, traders, producers and service and input providers for active participation in pilot fruit supply chains.
- Jointly with supply chain partners formulate action plan for pilot projects
- Explore options for public and private co-funding of pilots projects.
- Debriefing results of the mission to the Agricultural Attaché.
- Reporting on the mission

Implementation

- Supply chain specialist with knowledge of fruits and Asian markets
- Alex van Schaik (APR-Fruit). Technical, logistics and physiological aspects.
- Fruit expert Dept. Agriculture, Dir. Fruits