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Vegetable value chains in Eastern Indonesia—a focus on chilli

SADI-ACIAR research report

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2 Executive summary

Indonesia, the fourth largest market in the world with a population of 220 million in 2005, is forecast to reach almost 250 million people by 2015, making it a large food market. Consumption of fresh food is increasing and urban based consumers are becoming more health and convenience conscious. This has opened up opportunities for the modern retail sector to expand further into fresh foods, such as the offer of hydroponic and organic vegetables.

Indonesia has over 17,000 islands and this provides a major challenge to distribute fresh products nationally. Most of Indonesia's locally produced fresh vegetables (cabbage, potato and chilli) are distributed throughout Indonesia in non refrigerated transport. However, there is increased use of airfreight for select high value fresh vegetables for inter-island trading where there is shortage of local supplies.

The traditional wet markets still dominate fresh food trade however there is an increasing trend of food purchases at modern retail outlets. Most supermarkets and hypermarkets in Indonesia have expanded their share of the retail market with the opening of new stores throughout major cities in Indonesia and with an increased emphasis on fresh food and higher value lines, such as hydroponic and organic vegetables. Both Matahari Hypermart and Hero supermarkets are now offering a full range of ingredient vegetables and other food items essential for Indonesian cooking. In the vegetable section, there is now a full range of chilli (five varieties), ginger, onions, garlic, pepper etc.

Indonesia's vegetable production has increased by an average of 8% per year since 2001 from 6.9 million tons to reach more than 9 million tons (excluding almost 31 million tons of mushrooms) in 2005, from almost one million hectares of land; an average yield of 9.6 tons per hectare. The main vegetables grown in Indonesia (besides mushrooms) are cabbages, chilli, potato, shallots/onions and tomato.

There are 33 provinces in Indonesia that produce over 20 types of vegetables; however 85% of all vegetables are grown on the islands of Java and Sumatra. The major vegetable producing provinces are: West Java (35.6%), Central Java (13.3%), East Java (11.9%) and North Sumatra (10.3%); these four provinces account for over 70% of all vegetable production.

Imported vegetables accounted for only 4% of total consumption in Indonesia in 2005.

East Indonesia accounted for only 11.6% of the volume of all vegetables produced in Indonesia in 2005 yet has 16.0% of the population; this represented an average of 28.7 kg per capita compared to an average across Indonesia of 39.8 kg per capita. Therefore Eastern Indonesia is a net importer of vegetables, with supply mainly from Java.

North Sulawesi (274,134 tons) and South Sulawesi (256,153 tons) are the main vegetable producing provinces in Eastern Indonesia in 2005 with 52% share of all vegetables from the 13 provinces in Eastern Indonesia.

The province of South Sulawesi has a topography and climate that is suitable for vegetable production and hence grows a wide range of vegetables for local consumption and inter-island trading. South Sulawesi produces about 256,000 tons of vegetables from almost 55,000 hectares of land; an average yield of 4.7 tons per hectare. The main vegetables grown in

South Sulawesi are: cabbage (25.4%), chilli (15.3%), yardlong bean (7.9%), leek (6.5%) and tomato (6.3%).

The main issues, related to vegetable supply, for retailers in Makassar, the capital of South Sulawesi are:

- Consistency in quantity with a lack of local vegetable supply from Sulawesi, especially in the rainy season with retailers requiring to source supply from Java.
- Lower quality of local fresh produce compared to product sourced from Java.
- Large price fluctuations for some vegetables like chilli.

Production of chilli in Indonesia has been increasing by an average of 20% per year since 2001 to reach over 1 million tons in 2005 from about 190,000 hectares; accounting for about 12% of vegetable production. Over 60% of chilli is produced in Java with west Java (198,000 tons) being the major source of large chilli and east Java (143,000 tons) being the major source of small chilli. There is a wide variation in yields of large and small chilli.

The chilli sauce manufacturing industry is based on the island of Java (which has over 60% of all chilli production for fresh and processing) with 10 major companies and 12 manufacturing plants.

A value chain analysis of four supply chains of chilli found that supply to supermarket gives the highest return to farmers. The lowest value chain is a channel to traditional markets.

The major issues facing the chilli industry in South Sulawesi are:

1. Low productivity
2. Benefiting from opportunities for value adding on the farm
3. No post harvest or cold chain management
4. Market development opportunities
5. Weak farmer bargaining power

It is recommended that there is a need to link smallholders to more dynamic markets such as channels to modern retailers and the food processing industry. Technical assistance to farmers is also needed on more efficient cultivation technology to increase productivity and the application of post harvest handling.

3 Introduction

Indonesia is a large and diverse market with a population of 220 million people spread across 33 provinces¹. The majority of the population and wealth is in the provinces in the western part of Indonesia. However, the Indonesian Government and international aid donor organisations are increasing their resources in the eastern provinces of Indonesia to improve the livelihoods of the local people.

Many of the vegetable industries in Eastern Indonesia have production constraints, such as pest, disease, water and nutrient management.

With the implementation of the Smallholder Agribusiness Development Initiative (SADI) in Eastern Indonesia, there is an opportunity to gain a greater understanding of the market-driven constraints that effect the development of the Indonesian vegetable industry. These constraints may have an affect throughout the supply chain.

Competitive supply chains are focused on demand pulled cooperation (not supply pushed) and systems. According to Rijnconsult², “Value chains are a strategic collaboration of organizations for the purpose of meeting specific market objectives over the long term and for the mutual benefit of all links of the chain”. There are many types of supply chains in operation however for a supply chain to be effective and increase value along the chain it requires coordination, customer focus and sharing of market knowledge along the chain. These issues are addressed in this report.

A value chain analysis of the chilli industry was undertaken to determine the market demand issues facing the vegetable industry in Eastern Indonesia including: productivity, processing and value-adding, postharvest and cool chain management, distribution capability and market development.

This report provides an overview of issues impacting on the market demand for vegetables (section 2) as well as the marketing channels that are used in the delivery of vegetables to consumers (section 3); this includes a discussion on consumer shopping patterns and the role of the modern retailers. Production, imports and exports of vegetables are discussed in section 4.

Section 5 provides detailed information on the vegetable industries in Eastern Indonesia provinces of South Sulawesi, South East Sulawesi, NTB and NTT while section 6 provides an analysis of the chilli industry in Indonesia with a focus on South Sulawesi.

A summary of the key issues that impact on the growth of the chilli industry are presented in section 7.

¹ In 2007, there are 33 provinces in Indonesia. 2005 data quoted in the report was analysed when there were only 31 provinces. New provinces are Riau islands and West Sulawesi.

² AFFA, *Supply Chain Learning for Australian Agribusiness, 2000*, page 9

4 Market Demand for Fresh Vegetables

4.1 Market size, Composition and Growth

Indonesia's population is forecast to increase by an average of 1.3% per year over the next 10 years to reach 250 million people in 2015, making it a large market for fresh and processed vegetables.

The majority of the population live on the island of Java (58%), followed by Sumatra (22%). The population of the four provinces, within the Smallholder Agribusiness Development Initiative (SADI) of Eastern Indonesia (South Sulawesi, South East Sulawesi, NTT and NTB), is 19.1 million people (almost the size of Australia) and represents 8.7% of Indonesia's population

Urbanization is becoming widespread in Indonesia with people moving to the cities for better education and employment. The urban population represents 45% of the population in 2005 and is forecast to increase to 52% in the next ten years. This provides a greater population base for the modern retailer and has ramifications for local suppliers of vegetables.

Indonesia is the largest Muslim country in the world with over 88% of the population following Islam as their religion. Protestants and Catholics are the next major religious group comprising 9% of the population, followed by Hindu (2%) and Buddhist (1%). Since Muslim consumers may only consume food that meets strict halal guidelines, this makes Indonesia the largest halal food market in the world.

4.2 Food consumption patterns and trends

Food still holds the major share (55% in 2004) of the average per capita expenditure of Indonesians. However, food expenditure as a percentage of total expenditure is declining, indicating that people are becoming more affluent.

Table 1: Food Budget Shares for 9 Countries *

Country	Beverage Tobacco	Breads & Cereal	Dairy	Fats & Oils	Fish	Fruit & Vegetable	Meat	Total Food Expenditure
Indonesia	11.3	33.5	5.7	4.7	8.7	23.7	5.1	54.6
Philippines	11.9	29.7	6.7	1.8	14.5	11.1	14.5	48.4
Thailand	28.6	16.1	5.2	2.8	3.3	16.4	18.6	28.6
UK	47.5	8.3	6.9	1.3	2.3	12.0	12.6	16.4
Australia	25.2	13.5	9.7	1.7	3.1	18.3	16.9	15.1
Japan	23.1	22.3	4.8	0.7	17.0	12.8	7.8	14.9
Singapore	25.2	10.3	5.0	1.8	15.0	18.1	13.3	13.0
Hong Kong	17.9	9.0	3.4	3.3	19.7	11.8	22.7	10.3
USA	28.7	11.4	8.6	1.8	1.2	14.7	19.6	9.7

* Total food budget shares are per cent of total expenditure; food sub-groups shares are per cent of total food expenditure.
Source: www.ers.usda.gov

The majority (33%) of Indonesian food expenditure is in the category "bread & cereals" (mainly rice and noodles from wheat flour). This is followed by "fruit and vegetables" at 24% while "meat" and "dairy" consumption represents only 5% each of Indonesian daily food budget.

Australian consumers spend a higher proportion of their food budget on meat, dairy and beverages (Table 1).

Consumption of fresh food is increasing, mostly because fresh foods are more widely available and consumers are able to store at home. Consumption of vegetables has been increasing, although at a slower rate compared to other horticultural products. Better logistics makes fresh food more readily available to consumers. Urban consumers are becoming more health and convenience conscious and more aware of food safety issues. This has opened up opportunities for the modern retail sector to offer product lines such as hydroponic and organic vegetables, both of which are prepacked and supplied from specialized local producers.

A major retail player in the Indonesian organic food and lifestyle business is “Healthy Choice” which started in 2002 and now has 7 retail stores with 2 more opening in 2007. Healthy Choice promotes a “new way of enjoying life to the fullest” and offers over 200 organic food items for sale with most products coming from USA, EU, Taiwan and NZ.

There is increasing interest by some consumers in Indonesia about healthy lifestyles and Healthy Choice is leading the way by informing and promoting organics.

Table 2: Consumption of Fresh Horticultural Products, Kg per capita

	1998	2003	% change (1998 – 2003)
Potatoes	9.70	10.85	11.86
Fresh Tomatoes	1.42	1.61	13.54
Green Vegetables	30.68	32.50	5.92
Citrus Fruit	2.83	3.39	19.87
Other Fruit	27.71	31.13	12.35

Source : Euromonitor from trade sources

However, the increase in fresh food consumption is not as fast as the increase in ready-to-eat food and packaged food. Indonesians love to eat convenient and practical foods. Packaged foods such as bagged chips, ice creams and other snacks are often bought on impulse as part of the routine shopping at the supermarket. Frozen processed food is also gaining in popularity due to an increase in the availability of frozen foods and an increase in household ownership of refrigerators.

5 Food Marketing Channels

5.1 Distribution Issues

Indonesia provides a major challenge to distribute products nationally. Most of the distribution of local products is based around seaports and regional depots.

A major distribution problem for companies is the lack of refrigeration and an inferior road distribution system. In the past, there has been a lack of infrastructure investment in Eastern Indonesia and this has resulted in problems to maintain a cold chain system for perishable products from Eastern Indonesia.

A limited number of Indonesian companies operate national distribution businesses that cater for local and imported products. This involves the transportation of product from a central manufacturing/warehouse base to a number of regional depots in the main islands – Java, Sumatra, Kalimantan, Sulawesi, Bali/Lombok. Many importers and manufacturers sell to wholesalers/distributors who supply direct to retail and other customers.

In Jakarta, there is a major wholesale market (Kramat Jati) for local fresh fruit and vegetables while most imported fresh horticulture produce is sold direct to wholesalers (operating outside the domestic wholesale market) who distribute to retail markets.

Most of Indonesia's locally produced fresh vegetables (cabbage, potato and chilli) are distributed throughout Indonesia in non refrigerated trucks. However, there is increased use of airfreight for select high value fresh vegetables for inter-island trading where there is shortage of local supplies. There is also some use of small refrigerated trucks by producers supplying high value vegetables to the modern retail and food service markets in Jakarta.

5.2 Consumer Shopping Patterns

The traditional wet markets still dominate fresh food trade but there is a trend to shopping at modern outlets (AC Nielson, 2003).

Today, Indonesians are working longer hours than before, and more married women with children are working and want convenience. Indonesia's middle-income shoppers (approximately 30 million of the total population's 220 million) are becoming more trend and brand conscious. Their lifestyles are changing, and part of the change is shopping in supermarkets and hypermarkets rather than wet (traditional) markets.

However, more than 95% of household shoppers preferred to buy fresh meat, seafood and vegetables at traditional outlets while 21% of the shoppers preferred to buy their fresh fruit purchases at the modern retail outlets due to better displays and preservation systems and better access to imported fresh fruits (AC Nielson, 2003).

Consumers, who shop at the modern retailers, are becoming more health conscious and looking for "healthy" choices.

5.3 Role and growth of the Modern Retail Stores

Most supermarkets and hypermarkets in Indonesia have expanded their share of the retail market with the opening of new stores throughout major cities in Indonesia and with an increased emphasis on fresh food. Consumer spending at modern markets has increased from about 22% in 2000 to about 30% in 2004.

Retailers say they expect 17% growth in 2007 while hypermarkets and mini-markets will grow by 25%. Many retailers are likely to invest more in 2007 while some foreign retailers are planning to enter Indonesia in 2007/2008 including Metro (Europe) and Seibu (Japan).

There has been a gradual increase in modern retailers opening stores in regional Indonesia to meet the increased consumer purchase power in some provinces. About half of the 33 provinces of Indonesia have witnessed investment by the modern retailer. While the majority of the modern supermarkets and hypermarkets are located in Jakarta (with 109 modern retail stores), there are now a number of modern retailers located in provinces in Eastern Indonesia; seven are located in South Sulawesi.

Carrefour

French retail giant Carrefour will open more than 10 stores this year, to add to the current 28 outlets throughout the country, 19 of which are in Jakarta. Other locations include Bali, Surabaya, Makassar, Medan, Bandung, Surabaya and Palembang.

Matahari/Hypermart

PT Matahari Putra Prima (the Indonesian supermarket and department store operator) plans to triple the number of stores to 207 by year 2009. After opening 12 new hypermarket stores last year, Matahari will open up to 17 stores in 2007, in addition to the 18 Matahari hypermarkets (Hypermart) throughout the country.

Matahari Hypermart is placing more importance on meeting all needs of the consumer for food supply and is now offering a full range of ingredient vegetables and other food items essential for Indonesian cooking. In the vegetable section, there is now a full range of chilli (five varieties), ginger, onions, garlic, pepper etc being displayed for customers.

The Hypermart has 50 registered suppliers of local fresh fruit and vegetables. All trading terms are based on a one year agreement and weekly suppliers are chosen based on a tender for the best prices. There are 3 main chilli suppliers to the Hypermart from west and east Java with supplies based on an agreed weekly price.

While 65% of fruit sold by Hypermart is imported most of the vegetables are locally sourced.

There are no product specifications, no food safety or HACCP issues relating to fresh vegetables. The exception is on packaged hydroponic, aeroponic and organic vegetables that specify on the packaging that the product is “pesticide free”, “chemical free” or “organic”. However, Hypermart does no testing of these products. According to Matahari, it is too difficult to implement food safety standards for local vegetable suppliers.

Consumers are becoming increasingly interested in healthy choices so that “healthy” produce is growing in sales. These “healthy” choices include hydroponic, aeroponic and organic vegetables as they claim to be, amongst other things pesticide free.

There is an average of 5% wastage on fresh vegetable across all stores but this can vary and be up to 15% at some stores for vegetables.

Hero/Giant

The country's largest operator of supermarkets PT Hero Supermarket (Dairy Farm) has 241 outlets all over the country including a number of Giant hypermarkets. PT Hero Supermarket said it would open 41 new stores in 2007.

Hero supermarket has operated a fresh produce distribution centre with cold storage at Cibitung for almost 10 years. Hero has detailed product specifications for all their fresh fruit and vegetables. Produce which does not meet the specification is rejected at the distribution centre. However, it is only recently that procedures on acceptance of produce are being adhered to, with wastage reduced to about 7%.

Hero has one year trading terms with their suppliers but weekly supplies are based on tendered prices. Hero has two main suppliers of vegetables that buy from growers and pack in Jakarta for Hero, as per specification. The three main issues to address are produce cost, shelf life and quality.

For produce from eastern Indonesia the main concern is the high cost of transport and lack of cold chain.

Hero has ten A+ stores where there is an increasing interest in organic and pesticide free produce by consumers. These stores are independently checked on a monthly basis for food safety issues (meat and delicatessen sections) such as contamination.

Hero offers consumers four varieties of chilli and they sell about 1 to 2 tons per week per store in the Jabotabek (greater Jakarta) region. This is up from 500 kg per week since they have increased their focus on ingredients and improved the ingredient display section.

6 Indonesian Vegetable Industry and Regional Supply Channels

6.1 Indonesian Vegetable Production

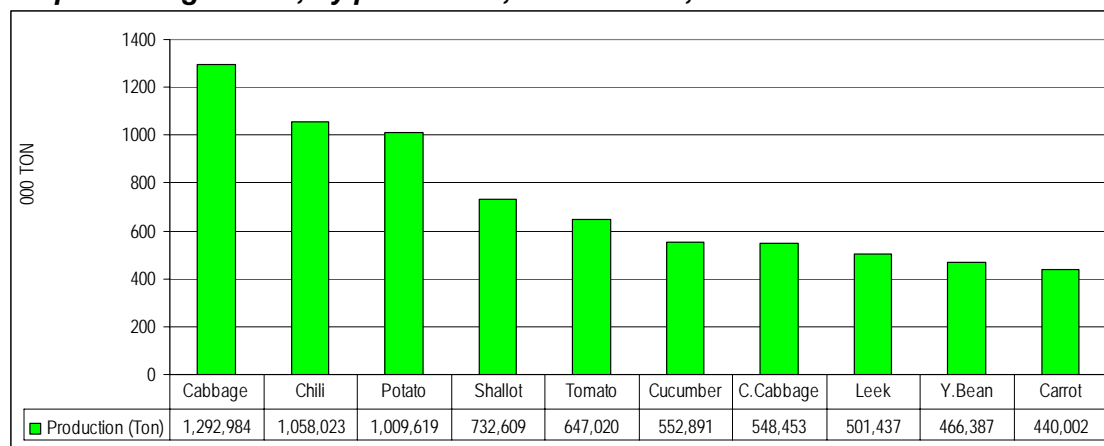
Overview

Indonesia's vegetable production has increased by an average of 8% per year since 2001 from 6.9 million tons to reach more than 9 million tons (excluding almost 31 million tons of mushrooms) in 2005, from almost one million hectares of land with an average yield of 9.6 tons per hectare.

Chilli production uses 20% of the vegetable land but only produces 12% of the total vegetable output due to low average yields. Whereas, both cabbage and potato use only 6.3% and 6.8% respectively of the vegetable land and have much higher yields resulting in large volumes of produce.

The main vegetables grown in Indonesia (besides mushrooms) and their average yields (tons per hectare) are as follows: Cabbages (22.4 t/ha), Chilli (4.7 to 6.4 t/ha), Potato (16.4 t/ha), Shallot/onions (8.8 t/ha) and Tomato (12.6 t/ha).

Graph 1: Vegetables, by production, in Indonesia, 2005



Regional Supply Channels

There are 33 provinces in Indonesia that produce over 20 types of vegetables; however 85% of all vegetables are grown on the islands of Java and Sumatra.

The major vegetable producing provinces are: West Java (35.6%), Central Java (13.3%), East Java (11.9%) and North Sumatra (10.3%); these four provinces account for over 70% of all vegetable production.

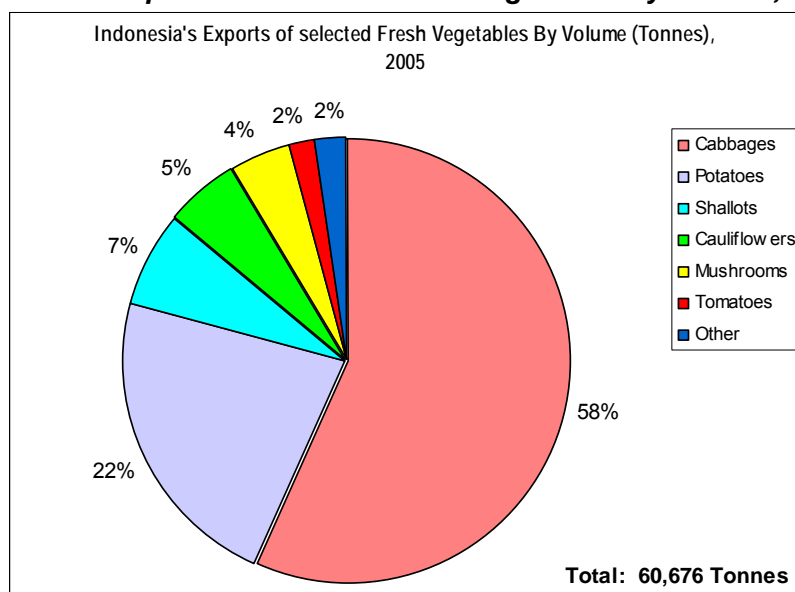
In Eastern Indonesia the provinces of North Sulawesi and South Sulawesi are the only major vegetable producers with 3.1% and 2.9% respectively of total Indonesian production.

6.2 Indonesian Vegetable Exports

In 2005, Indonesia exported 60,000 tons of vegetables worth about US\$18 million; this represented only 0.2% of production.

The main vegetable exports were cabbages, potato, mushroom and shallots/onions.

Figure 1. Indonesia's Exports of Selected Fresh Vegetables by Volume, 2005



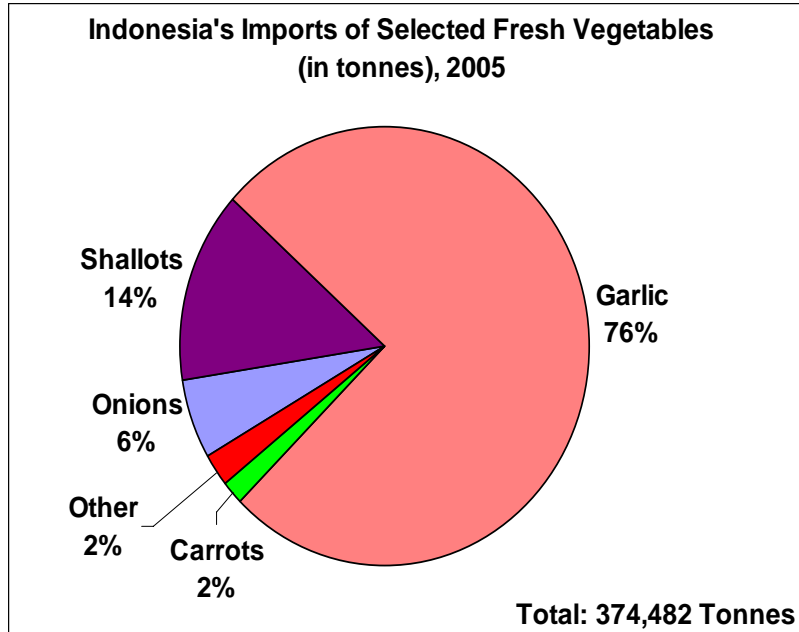
6.3 Indonesian Vegetable Imports

Indonesia imports a wide range of vegetables by sea and some by airfreight for supermarkets, hotels and restaurants. Indonesian vegetable imports have tripled (in value) over the last ten years to reach US\$98.0 million (374,000 tons) in 2005, up from US\$33.4 million (53,500 tones) in 1994.

The main vegetables imported in 2005 were garlic (283,283 tons), shallots (53,071 tons) and onions (22,133 tons). These three vegetables comprised 96% of the volume and 91% of the value of Indonesia's vegetable imports in year 2005. China is the main supplier of garlic, shallots and onions.

Imported vegetables accounted for only 4% of total consumption in Indonesia in 2005.

Figure 2. Indonesia's Import of Selected Fresh Vegetables by Volume, 2005



7 Eastern Indonesian Vegetable Industry

7.1 Overview

East Indonesia accounted for only 11.6% of the volume of all vegetables produced in Indonesia in 2005 yet has 16.0% of the population; this represented an average of 28.7 kg per capita compared to an average across Indonesia of 39.8 kg per capita. Therefore, Eastern Indonesia is a net importer of vegetables, mainly from Java.

North Sulawesi (274,134 tons) and South Sulawesi (256,153 tons) are the main vegetable producing provinces in Eastern Indonesia³ in 2005 with 52% share of all vegetables from the 13 provinces in Eastern Indonesia.

While there are 20 main vegetables grown in Indonesia, some of the provinces in Eastern Indonesia grow predominately one specific vegetable as follows:

North Sulawesi (60% potato)

NTB (52% shallot)

Most of the potatoes from North Sulawesi are grown under contract to Indofood's Fritolay for snack food. Potato farmers in North Sulawesi are paid a fix price and are provided with agronomic advice by Indofood. The potatoes are delivered by open door 20 foot container by sea to Jakarta, a journey of 5-6 days, at an agreed factory delivered price that is less than the price of potatoes from West Java. The cheaper price is due to the lower costs of land and production costs in North Sulawesi.

The province of South Sulawesi has a topography and climate that is suitable for vegetable production and hence grows a wide range of vegetables for local consumption and inter-island trading.

Table 3. Vegetable Production and Population by Provinces in East Indonesia, 2005

Province	Production Tons	%	Population Millions	%	Per capita Consumption (kg)
South Sulawesi	256,153	2.9	8.5	3.9	30.1
S.East Sulawesi	34,577	0.4	2.1	0.9	16.5
NTT	50,413	0.6	4.1	1.9	12.3
NTB	157,794	1.8	4.4	2.0	35.9
Total	498,937	5.7	19.1	8.7	26.1
Other East Indonesia*	516,507	5.9	16.3	7.3	31.7
Total East Indonesia	1,015,444	11.6	35.4	16.0	28.7
Other	7,719,263	88.4	183.8	84.0	42.0
Total Indonesia	8,734,707	100.0	219.2	100.0	39.8

* includes 9 provinces of Papua, West Irian Jaya, Maluku, North Maluku, Gorontalo, Central Sulawesi, North Sulawesi, East Kalimantan and South Kalimantan.

Sources : BPS – Statistics Indonesia and Directorate General of Horticulture Production Development

³ Refers to 13 provinces: Papua, West Irian Jaya, Maluku, North Maluku, Gorontalo, Central Sulawesi, North Sulawesi, South Sulawesi, South East Sulawesi, East Kalimantan, South Kalimantan, NTT and NTB.

7.2 South Sulawesi

Population

The population of the province is 8.5 million people and is forecast to reach 9.1 million by 2015; an average annual increase of 1.0%. This is the seventh largest (in terms of population) province in Indonesia and the largest outside of the islands of Java and Sumatra. South Sulawesi has a land area of 62,482 km² and the provincial capital is Makassar.

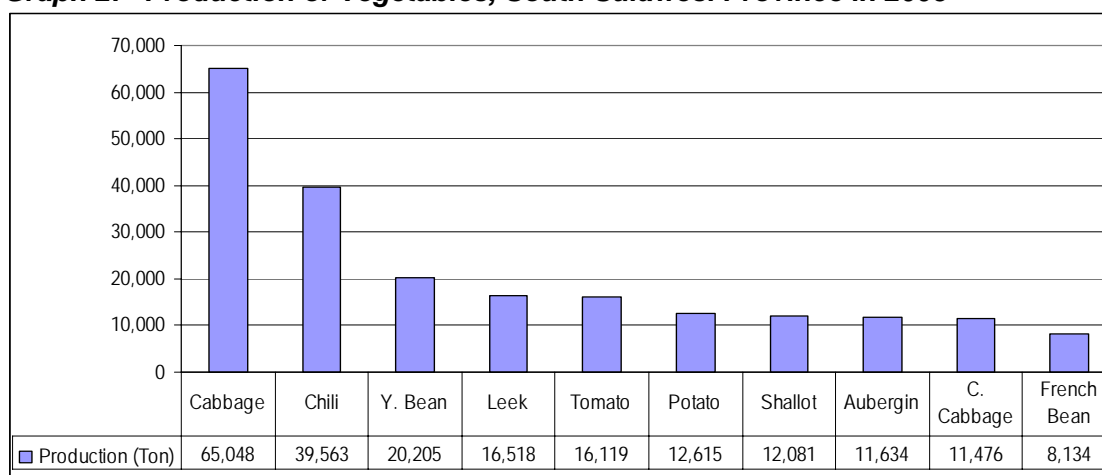
Vegetable production

South Sulawesi produces about 256,000 tons of vegetables from almost 55,000 hectares of land; an average yield of 4.7 tons per hectare.

The main vegetables grown in South Sulawesi and their average yields (tons per hectare) are as follows:

- Cabbage (25.4%) – 23.9 t/ha
- Chilli (15.3%) – 2.4 to 4.9 t/ha
- Yardlong Bean (7.9%) – 3.4 t/ha
- Leek (6.5%) – 8.1 t/ha
- Tomato (6.3%) – 3.2 t/ha

Graph 2: Production of Vegetables, South Sulawesi Province in 2005



South Sulawesi is divided into 2 geographical and climatic areas - east and west based on the mountains in the centre. When the eastern part of South Sulawesi is raining then the western part will be dry. This offers opportunities for all year round continuous production of vegetables.

There is also a divide between low land agriculture (hotter climate) and the highland where it is cooler and more suitable for vegetable production.

Vegetable production in the province of South Sulawesi occurs mainly in the regencies of Enrekang and Gowa.

- Potato – Enrekang (50%), Gowa (31%), Tator (9.9%) and Bone (6.2%)
- Cabbage – Enrekang (90%), Gowa (5.2%) and Tator (2.2%)
- Big chilli – Enrekang (18%), Gowa (17.4%) & 4 regencies with about 7-8% each
- Small chilli – Tator (15.9%), Gowa (11.3%) and Takalar (11.3%).

Enrekang regency is in the north of the province (about 10 hours by road) while Gowa regency is in the mountains near the capital city of Makassar (about 2 hours by road).

Case Study - Port of Makassar

Makassar is one of four port authorities in Indonesia under the control of central government (Medan, Jakarta, Surabaya and Makassar). Makassar port has responsibility for eastern Indonesia (from eastern Kalimantan) and covers 18 ports. The main reefer ports are: Makassar, Bitung (near Manado), Balikpapan, Sorong (Jayapura).

The transportation cost of containers (reefer or non reefer) is as follows;

- Makassar to Jakarta – 20 ft = Rp3.5 million; 40ft = Rp4.0 million
- Makassar to Surabaya - 20 ft = Rp2.5 million; 40ft = Rp3.0 million

The above price does not include charges etc and is negotiable depending on demand. According to an importer the cost for a mixed refrigerated container of fruit which is sent by sea from Jakarta to Makassar is Rp 18.5 million for a 40 foot container and Rp 14.5 million for a 20 foot container.

There are 281 exporters registered with Customs in Makassar; about 60 of them export produce (mainly seafood) in refrigerated containers.

Cargo flow at the port of Makassar has been increasing from 6.3 million tons in 2000 to 8.9 million tons in 2004 (most of this is domestic inter island trade with only 22% being export/import).

Export of produce by containers has increased from 10,682 (TEU)⁴ in 2000 to 12,283 (TEU) in 2006. This compares to imports of containerized produce of only 1,262 (TEU) in 2006 while domestic containerized cargo was a massive 242,526 (TEU) in 2006.

The top 10 items exported are: clinker, cocoa, marble, cement, wood & plywood, seafood, cashew, rubber, coffee and molasses.

Case Study – Retail Diamond Supermarket, Mal Panakkukang

Diamond is one of three supermarket tenants in the main retail mall in Makassar – with Carrefour and Hypermart the other food retailers within the mall. The mall is very busy with almost 2 million visitors per month and never less than 20,000 per day.

Diamond Makassar brings 1 x 20 ft reefer container per week of chilled produce from Jakarta and one open truck (20 tons) per week of fresh produce (vegetables etc) from Surabaya.

⁴ TEU - Container capacity is measured in twenty-foot equivalent units (TEU, or sometimes teu). An equivalent unit is a measure of containerized cargo capacity equal to one standard 20 ft (length) x 8 ft (width) x 9 ft in (height) container.

The main vegetables issues for retailers in Makassar are:

- Consistency in quantity – there is a shortage of specific vegetables from Sulawesi, especially in the rainy season, and therefore there is a need to bring in produce from Java.
- The local quality of fresh produce is not as good as produce from Java.
- There can be large fluctuations in price for some vegetables like chilli (up to Rp 25,000 per kg in December from a low of about Rp 6,000 per kg).
- There is no farmer coordination, no organized distribution and no private sector investment (except PT Focus at Malino).

Diamond has one major supplier (collector) for 80% of their vegetable needs. The collector buys direct from the farmer and the wet retail market (pasar). There is no formal contract or written product specifications. If the produce does not meet Diamond's quality requirements (visual) they will inform the collector who may choose to buy from another farmer. There are no penalties or no formal or informal information flows back to the farmer so the farmer receives no information to enable him to modify practices.

Case Study - Collector of cabbages from Malino

South Sulawesi grows cabbages (65,048 ton) for local consumption and inter-island trading. At Malino (3 hours from Makassar) collectors load cabbages into trucks for shipment to East Kalimantan. The cabbages are packed into sacks in the field. Each sack is weighed (about 70 kg each) before it is emptied then the individual cabbages are loaded and stacked one by one into the truck. They are compressed to stop movement and the cabbage leaves are not removed as this is their natural packaging and protects the product.

The truck was destined for Balikpapan (East Kalimantan). There is an average of 8% wastage by the time the truck arrives at the market. The price for the product that is damaged is split 50% between collector and buyer. The other product is sold on an agreed predetermined fixed price of Rp 1,500 per kg. The farmer gets paid Rp 600 – 650 per kg (about 40% of the selling price) and the truck costs Rp 150 per kg. The collector gets paid up to Rp 700 per kg (or Rp 14 million per truck).

Case Study - PT Focus Malino (Greenfields Malino) – Integrated Vegetable business

Focus is a modern integrated vegetable business. It is a 50% joint venture from a Dutch person with the local government. Focus is a modern farm (with at least three tractors and modern equipment) and packing shed (grader and washer for potatoes and carrots) and two cool stores with capacity of 40 tons of produce. Most of the equipment is imported.

The company has invested EU\$ 1.7 million in developing this modern facility. Focus has 30 hectares of land that it owns and contracts out to 20 farmers for additional supply. It chooses farmers that are not close to the main road as they are able to negotiate a cheaper price. The business was set up about 18 months ago based on research by Focus that found there was a large margin between the price growers received and the market price. Focus pays the growers about 20% higher than other farmers receive and is able to supply direct in refrigerated trucks to the modern retailers, such as Hypermart and Diamond in Makassar at lower prices than competitors. Focus has established a supply chain based on providing its customers with a quality product at competitive prices.

The company aims to be the major supplier of fresh vegetables in Eastern Indonesia to the modern retail and the food service (hotels / restaurants and catering) sectors. Target provinces include all provinces from East Kalimantan to Papua.

At this stage, there are no formal product specifications or HACCP systems only verbal specifications. All sorting and packing is done at the packing shed located on the farm at Malino. Some of the vegetables (like cabbage) are shrink-wrapped and packed into plastic crates before cool storing and sending to Makassar in a refrigerated truck.

The company needs more supply and has an opportunity of being a major hub (like a cooperative) for the district and contracting to a wider range of growers to meet their expansion plans.

Case study – Potato Farmer at Malino

A major potato farmer (Musanto) of granola variety operates 47 hectares, with a nursery, about 10 cattle used for organic fertilizers, 3 tractors and 2 trucks. Chemical application is via overhead sprinklers.

There is a sub agribusiness terminal (built by the Ministry of Agriculture) on the farm which is used for sorting of potatoes into sizes (S, M, L) and then into 70 kg bags. The bags are then stored in a shed until the volume is sufficient to load onto a truck for distribution to the markets of Surabaya, Makassar or Balikpapan. Cost of transport is about Rp 250 per kg to Balikpapan (Rp 5 million per truck for 20 tons).

The farm employs a university graduate (plant health) as production and nursery development manager. The farm now grows the Atlantic variety (crisping) in the nursery and will be seeking a contact from Indofood.

7.3 South East Sulawesi

Population

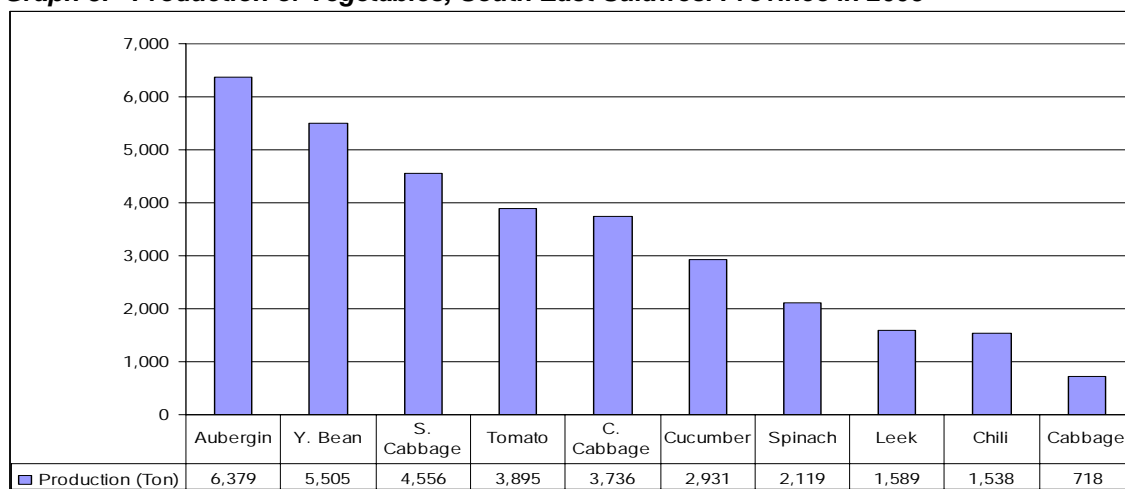
South East Sulawesi is one of the most remote regions of Sulawesi with no highway connecting it to the other provinces on the island of Sulawesi. The main transportation link is a ferry across the Bone Sea between Watampone (Bone) in South Sulawesi and the port of Kolaka in South East Sulawesi. The population of the province is 2.1 million people, mostly centered on Buton island off the south coast of South East Sulawesi and in and around Kendari (the capital). The population is forecast to reach 2.65 million by 2015; an average annual increase of 2.7%.

Vegetable production

South East Sulawesi produces about 35,000 tons of vegetables from almost 7,500 hectares of land; an average yield of 4.6 tons per hectare. The main vegetables grown in South Sulawesi and their average yields are as follows:

- Aubergine (18.4%) – 8.4 t/ha
- Yardlong Bean (15.9%) – 4.5 t/ha
- Swamp Cabbage (13.2%) – 5.8 t/ha
- Tomato (11.3%) – 5.4 t/ha
- Chinese Cabbage (10.8%) – 6.5 t/ha

Graph 3: Production of Vegetables, South East Sulawesi Province in 2005



Key issues for vegetable production in South East Sulawesi are:

- The province imports a lot of vegetables from Makassar (South Sulawesi) and Surabaya (East Java) as the climate in South East Sulawesi is too hot for growing large volumes of vegetables.
- Need to improve the adoption of technology
- There is no agribusiness sub-terminal in the district which would require investment
- There is a need to strengthen the linkage between collectors and farmers for long term partnerships. The system of collector coming to the farmer and the farmer accepting the price only benefits the collector (who makes the largest profit).

The major agricultural crops in the province are: cocoa, seafood and cashew.

Case Study – Retail market Pasar Baran

A wide range of fresh produce is available at the local retail market. Local Large chilli retail for Rp 10,000 per kg while the smaller curly chilli was selling for Rp 5,000 (bought for Rp 4,000) per kg. The very small chilli was selling at Rp 5,000 per litre (2.5 litres per kg).

Outside the market a stall offered a service to customers by processing fruits (making coconut fibre) and vegetables (eg grinding chilli and other ingredients into sauce) for a charge of Rp 3,000 per bag (1-2 kg). The machine (with a pull start motor) costs about Rp 2 million to buy.

Case Study – Wholesale market Pasar Grosir

Most of the vegetables (potato, carrot, cabbage, tomato) for sale at the wholesale market in Kendari came from Makassar via bus. It takes 2 days via bus overland and ferry at a cost of Rp 600 per kg. The bus is a passenger bus loaded with about 20 passengers and sacks of vegetables squeezed into the space at the back of the bus or on the roof with other items (eg computers).

Local chilli was being offered for sale at Rp 6,000 per kg; it was bought for Rp 4,000 per kg. The trader does the sorting at the market. There is an opportunity to add value by processing the damaged and poor quality chilli. However, the cost of the grinding machine is seen as being too expensive.

7.4 Nusa Tenggara Barat (NTB)

Population

Nusa Tenggara Barat (NTB) is a province in south-central Indonesia. It covers the western portion of the Lesser Sunda Islands, except for Bali. The two largest islands in the province are Lombok in the west and the larger Sumbawa island in the east. Mataram, on Lombok, is the capital and largest city of the province. The population of the province is 4.3 million; 71% of the population live on the island of Lombok.

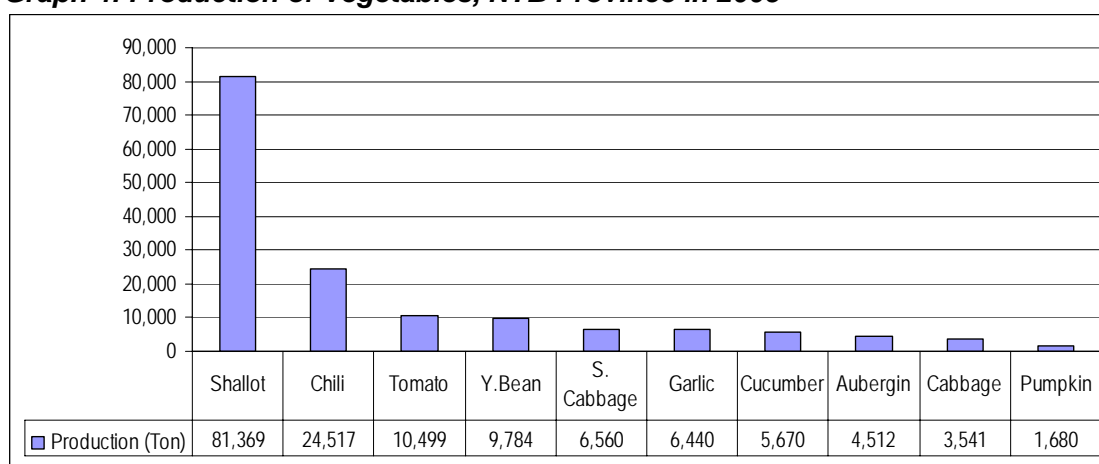
Vegetable production

NTB produces about 158,000 tons of vegetables from almost 26,000 hectares of land; an average yield of 6.1 tons per hectare. The main vegetables grown in NTB and their average yields (tons per hectare) are as follows:

- Shallot (51.5%) – 8.0 t/ha
- Chilli (15.5%) – 2.5 to 3.4 t/ha
- Tomato (6.6%) – 10.0 t/ha
- Yardlong Bean (6.2%) – 6.3 t/ha
- Swamp Cabbage (4.2%) – 17.4 t/ha

Production of shallots and small chilli from NTB are both ranked 4th in production output in Indonesia.

Graph 4: Production of Vegetables, NTB Province in 2005



7.5 Nusa Tenggara Timur (NTT)

Population

The population of the province is 4.1 million people and is forecast to reach 4.7 million by 2015. The religious mix of NTT is atypical of Indonesia, with 91% Christian (majority Catholic but a large Protestant population also) and only 8% Muslim.

East Nusa Tenggara (NTT) is located in the eastern portion of the Lesser Sunda Islands, including West Timor. The provincial capital is Kupang which is located on West Timor. The

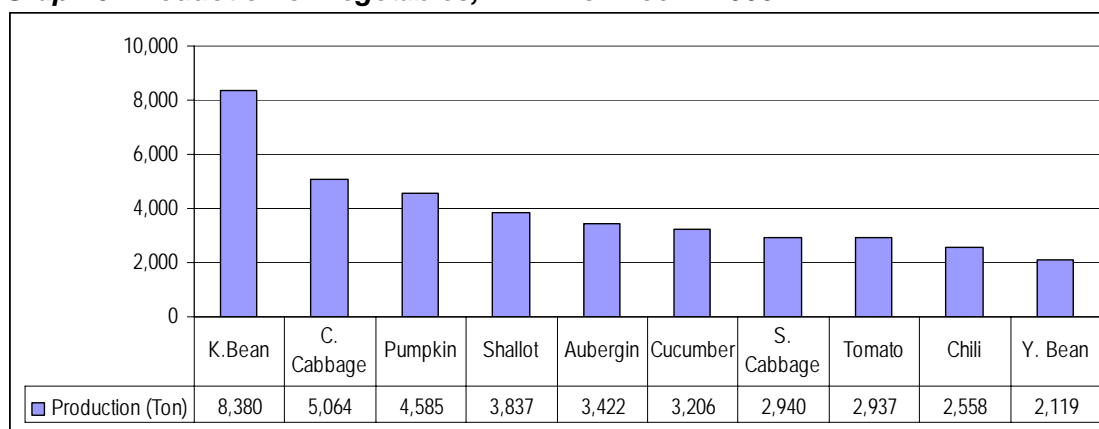
province consists of about 550 islands covering an area of 46,138 km², but is dominated by the three main islands of Flores, Sumba, and West Timor.

Vegetable production

NTT produces about 50,000 tons of vegetables from 11,000 hectares of land; an average yield of 4.5 tons per hectare. The main vegetables grown in NTT and their average yields (tons per hectare) are as follows:

- Red Kidney Bean (16.6%) – 3.2 t/ha
- Chinese Cabbage (10.0%) – 6.6 t/ha
- Pumpkin (9.1%) – 7.5 t/ha
- Shallot (7.6%) – 4.5 t/ha
- Aubergine (6.8%) – 6.9 t/ha

Graph 5. Production of Vegetables, NTT Province in 2005



8 Focus on the Chilli Industry

8.1 Supply Overview

Production of chilli⁵ in Indonesia has been increasing by an average of 20% per year since 2001 to reach over 1 million tons in 2005 from about 190,000 hectares; accounting for about 12% of vegetable production. In 2005, the majority of chilli grown in Indonesia was large (red) chilli (661,730 tons or 62% of chilli production) with small chilli production being 396,293 tons (or 38% of chilli production).

Table 4. Indonesian Chilli in 2001 – 2005

Description	2001	2002	2003	2004	2005
Production	580,464	653,089	1,066,722	1,100,514	1,058,023
Harvested Area	142,556	150,598	176,264	194,588	187,236
Yield (Ton/Ha)	4.07	4.22	6.05	5.66	5.65

Source : Departemen Pertanian, Direktorat Jenderal Holtikultura, Direktorat Budidaya Tanaman dan Biofarmatika

⁵ Chilli is referred to as either (1) large or red chilli for multiple cooking uses, or (2) small chilli for sauce

Over 60% of chilli is produced in Java with west Java (198,000 tons) being the major source of large chilli (30% of Indonesia's production) and east Java (143,000 tons) as the major source of small chilli (36% of Indonesia's production).

Yields of large chilli range from 2.1 tons per hectare in Maluku to 12.7 tons per hectare in West Java while yields of small chilli range from 1.4 tons per hectare in South East Sulawesi to 11.8 tons per hectare in West Java.

Production of large and small chilli in South Sulawesi and South East Sulawesi is ranked in size (compared to all 33 provinces) in table 5. The table shows that South Sulawesi is a significant producer of chilli (both small and large) but is inefficient in productivity (yield). South Sulawesi is ranked one of the smallest producers of both small and large chilli and lowest yield.

Table 5. Production of Large and Small Chilli in South Sulawesi and S.E. Sulawesi

	South Sulawesi	South Sulawesi	SE Sulawesi	SE Sulawesi
	Large chilli	Small chilli	Large chilli	Small chilli
Production (Tons)	30,168 (7 th)	9,395 (8 th)	820 (27 th)	718 (28 th)
Production (HA)	6,152 (7 th)	3,840 (5 th)	367 (25 th)	518 (22 nd)
Yield (T/HA)	4.9 (11 th)	2.4 (27 th)	2.2 (29 th)	1.4 (31 st)

8.2 Chilli Manufacturing – A Java Perspective

The chilli sauce manufacturing industry is based on the island of Java (which has over 60% of all chilli production for fresh and processing) with 10 major companies and 12 manufacturing plants as follows: West Java (5), East Java (3), Central Java (2) and Jakarta (2). Major manufacturers of branded chilli sauce include Indofood and ABC Heinz, which both have 2 major factories each. (See Appendix 2) In addition there are numerous small home industry processors of chilli sauce e.g. PK Sinar in Makassar (South Sulawesi).

Case Study - ABC Heinz

ABC is the major processor and seller of chilli sauce in Indonesia with the major shelf space in the modern retailers.

ABC uses about 50 tons per day of fresh chilli. The company has contracts with growers for 50% of their needs at a fixed price of Rp 5,500 per kg delivered to the factory in Jakarta. The other 50% of supply is bought at spot prices from collectors; this can fluctuate from Rp 2,000 per kg up to Rp 15,000 per kg. ABC works with the nutrition scientists from the Institute Pertanian Bogor to develop the right quality (hotness) of chilli to meet their consumer expectations.

Supply of chilli for ABC Heinz is from growers in East and West Java. ABC has an agronomy team that works with the growers on quality and pest and disease issues. The contracted growers must plant the variety of seed wanted by ABC. There are 25 farmers (per group) who work in one area of 5 hectares producing 2 tons on average. There is one agronomy supervisor for 50 hectares (10 groups). One supervisor is based in East Java and one supervisor is based in West Java. The supervisor meets with the farmer groups at least 3 times – before planting, during seeding and after harvesting.

The farmer aims for 0.5 kg to 0.9 kg per plant depending on the soil and management. The collector will grade the chilli to meet the product specifications by ABC. ABC aims to improve issues with food safety with farmers by improving the collection of chilli so that there is no foreign matter when packaged.

There is no cold chain as the chilli is used within 48 hours of arrival at the factory. However, ABC has imported frozen chilli from China when local prices were high. There is a possibility of establishing a supply chain with chilli from Sulawesi depending on prices, quality and transport availability and cost.

8.3 Chilli Industry in South Sulawesi

The chilli industry in South Sulawesi is concentrated in two regencies – Gowa (south) and Enrekang (north).

There are two main forms of chilli produced in Indonesia, commonly described as small chilli and Large chilli. In South Sulawesi there are a number of key differences between small chilli and Large chilli producers:

Small chilli producers do not use high quality certified seed, whereas farmers in the same province producing Large chilli are using certified seed. The use of certified seed is used due to stronger market demand and greater intensity of cultivation.

Small chilli cultivation appears to be less intensive and uses less chemical inputs compared to large chilli farming. In general, farmers in South Sulawesi use limited fertilizers and pesticides in comparison to chilli farming in East Java, which is highly commercialized with farmers using large quantities of fertilizers and insecticides.

Small chilli cultivation uses less intensive labor treatment and technology application. Large chilli cultivation in South Sulawesi, however, is similar to what farmers in East Java are applying.

Chilli production in South Sulawesi clearly needs a lot of improvement as it is way below its production capacity in both, small chilli and large chilli. Based on farmer surveys, small chilli productivity in South Sulawesi is less than 3 ton per ha which is only 50% of chilli productivity in East Java (6 ton per ha). Similarly, large chilli productivity in South Sulawesi is 3.7 ton per ha which is only 25% of large chilli productivity in East Java (15 ton per ha).

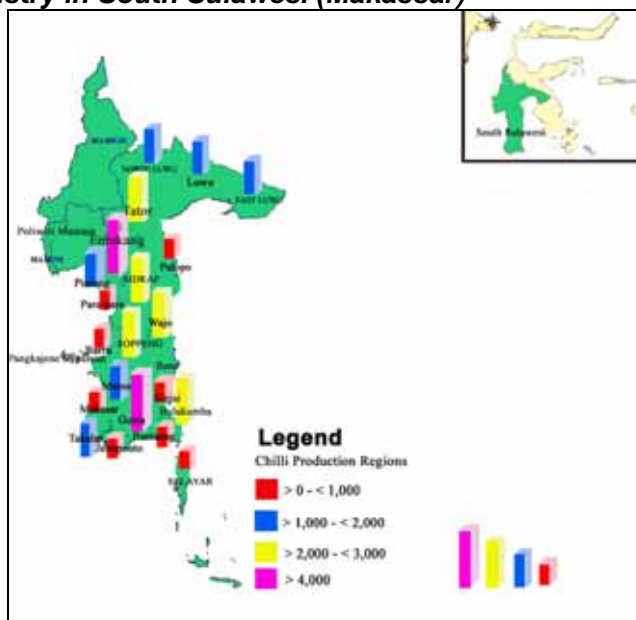
One of the problems with the supply chain system is that collectors of fresh produce are not permanent (like in Java); they are flexible. There is a need to strengthen the system between collector and farmer. Another problem is the fluctuating price which results in limited commitment by farmers to grow chilli, after they have a bad harvest with low prices.

There are options for value adding with some drying occurring then blending for the industrial sector.

Managing the relationship between supply (harvest time) and demand is critical to enable reasonable prices to be paid to growers. Supply is erratic and there is a need for some system to manage crop production. While August – September is the peak season for chilli, prices

decrease when production from the northern regencies are higher. Supplies to the local market decline when demand from Kalimantan and Papua increases in October – November.

Figure 3: Chilli industry in South Sulawesi (Makassar)



The most common form of supply chain during the peak production season is the grower selling direct to the traditional markets (via collector). When supply is low, the traders visit the growers and buy direct. Growers are aware that prices must be higher when the wholesale traders visit the farmers so they try and get information from other traders. There is no formal market price reporting system to alert framers of market prices.

As an example, in May 2006, prices for chilli dropped from Rp 7,000 per kg to Rp 3,500 per kg in two weeks. This was mainly due to an increase in supply. Break even price is about Rp 2,000 per kg.

The trader sells chilli without grading at most retail markets. Sorting only occurs at the wholesale market for the modern retailers. Loses at the market are minimal at less than 1%.
Pasar Makassar:

Almost 90% of local chilli is sold through the wholesale market; about 30 to 50 tons per day. There are 2 main chilli traders; chilli can be sold to Surabaya and Balikpapan via airfreight if prices are good. The trader sells a sack of chilli (50 kg) with a profit margin of Rp 50,000 – Rp 70,000 per sack (Rp 1,000 per kg); however during the high season this will double.

There are about ten local SME processors of chilli for sauce – some add salt during storage to extend the shelf life of the product. PK Sinar, a local chilli sauce producer, buys from the market (5-10 tons per day) if the price is low or will buy direct from the farmer. PK Sinar manufactures chilli sauce in large beer bottles for the kaki lima and small food shops.

Case Study – Retail

Diamond sells about 100 kilograms per day of chilli from 5 different varieties (more than 20 times of Matahari Hypermart, in the same location). Diamond has a large food service customer base (hotels and restaurants) and is known to be the cheapest for fresh vegetables; pasar prices and large areas to display produce encouraging bulk purchase. The retail margin is 25% (after tax).

There is no HACCP, no food safety and no written specifications to suppliers. Wastage in the store is about 5% for vegetables. There is no feedback provided to farmers on quality only to the collector, but not always. There is no discount asked for if the product is of inferior quality.

The main problem is the lack of volume of supply of quality product. Many times the store will accept a vegetable product that does not meet visual expectation to ensure that they have product available for sale.

Retail prices for chilli at Matahari are as follows:

- Cabe merah keriting – Rp 15,900 per kg
- Cabe hijau TW – Rp 18,900 per kg
- Cabe rawit hijau – Rp 18,990 per kg
- Cabe rawit merah – Rp 19,900 per kg
- Cabe merah TW – Rp 13,250 per kg
- Cabe rawit Makassar – Rp 58,900 per kg

Case Study - Chilli Farmer

A farmer with approximately 0.5 hectares of land (handed down from the previous generation) had planted with small chilli and inter-planted with a mixture of aubergine vegetables and rambutan (fruit) trees. The chilli plants were about 1 metre apart but in no system. The plants will last about 2 years before dying and then being replaced.

Minimal inputs are applied. Some fertilizer (urea) is bought and used and some chemical spraying is done when the plants are big.

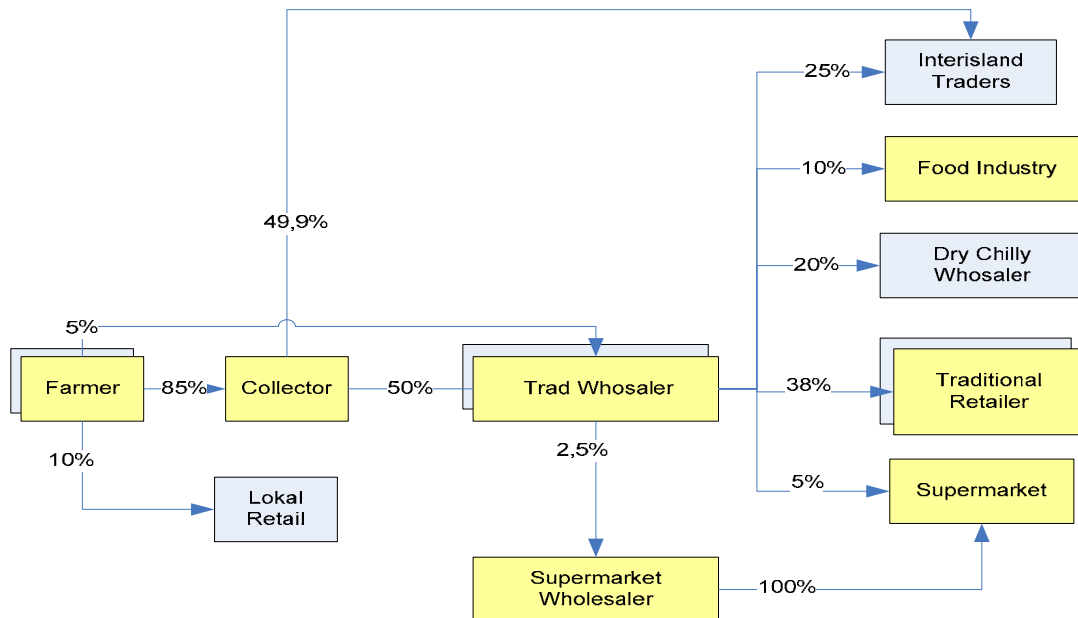
The small chilli is picked when it is red and sold by the litre from the farm to collector or direct to the market. No sorting occurs on the farm.

8.4 Supply chain comparison of Chilli in South Sulawesi, South East Sulawesi and East Java

Supply Chain of Chilli in South Sulawesi – an overview

In South Sulawesi, farmers sell chilli to local collectors (85%), traditional wholesalers (5%) and the local retail market (10%) (Figure #).

Figure 4. Marketing Channel of Chilli in South Sulawesi



Half the chilli production is sent, by collectors, to the other islands. The collectors from regencies of Majene, Mamuju, Sidrap, Enrengkang, and Tator send chilli from South Sulawesi to East Kalimantan. While collectors from the regencies of Bulukumba, Takalar, Wajo and Selayar, will often send the chilli to Southeast Sulawesi. The other 50% of the chilli bought by collector is marketed to wholesalers at the Pasar Terong central market in Makassar.

From the wholesaler in Pasar Terong, the chilli is sold to supermarket wholesaler (2.5%), directly to supermarket (5%), food processors (10%), to dry chilli wholesalers (20%), inter island traders (25%) and traditional market (38%). The wholesaler from South Sulawesi trades to most of Eastern Indonesia, including the cities of Balikpapan, Kendari, Ambon, Manado, Timika, and Jayapura.

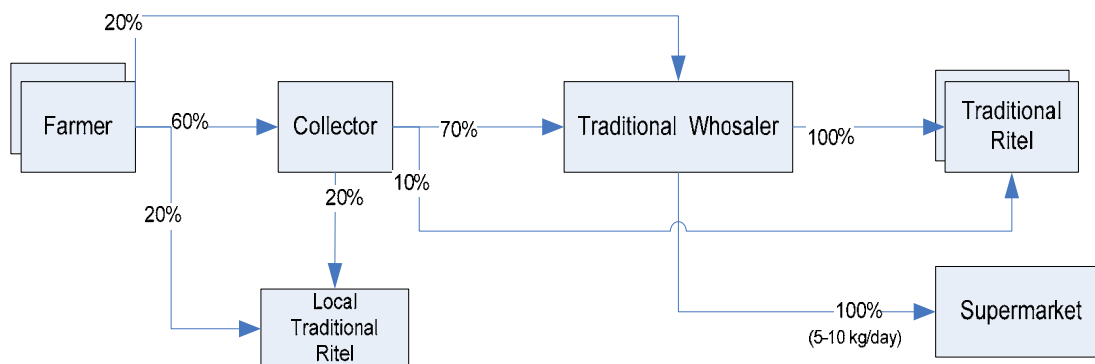
The total amount of chilli marketed through Pasar Terong central market is about 2-3 ton per day. Processors purchased increased volumes from the wholesale market when prices are low with PK Sinar, Sumber Baru, Merpati, and Sampurna regularly buying from wholesalers.

Supermarket procures chilli either direct from the wholesaler (5%) in Pasar Terong or from specialized supermarket wholesaler (2.5%). The traditional wholesaler supplies about 50-150 kg per day of fresh small chilli to supermarket and 100-250 kg per day of large chilli. Traditional wholesaler also supplies supermarket wholesaler with premium grade chilli (2.5%), with about 50-100 kg per day used by the supermarkets. Supermarkets that procure local chilli in South Sulawesi are Diamond and Makro (150 kg per day), Carrefour, Hypermart, Gelael, and Hero (10-50 kg per day).

Supply Chain of Chilli in South East Sulawesi – an overview

South East Sulawesi has a smaller and a shorter supply chain for local chilli (Figure 5). The supply of chilli for South East Sulawesi also comes from South Sulawesi through Pasar Terong. The chilli production in South East Sulawesi is limited and not continuous through out the year. While (according to a wholesaler at Pasar Kendari central market) the market demand for chilli for wholesale is at least 500 kg per day in Kendari, the capital of South East Sulawesi.

Figure 5. Supply chain of Chilli in South East Sulawesi

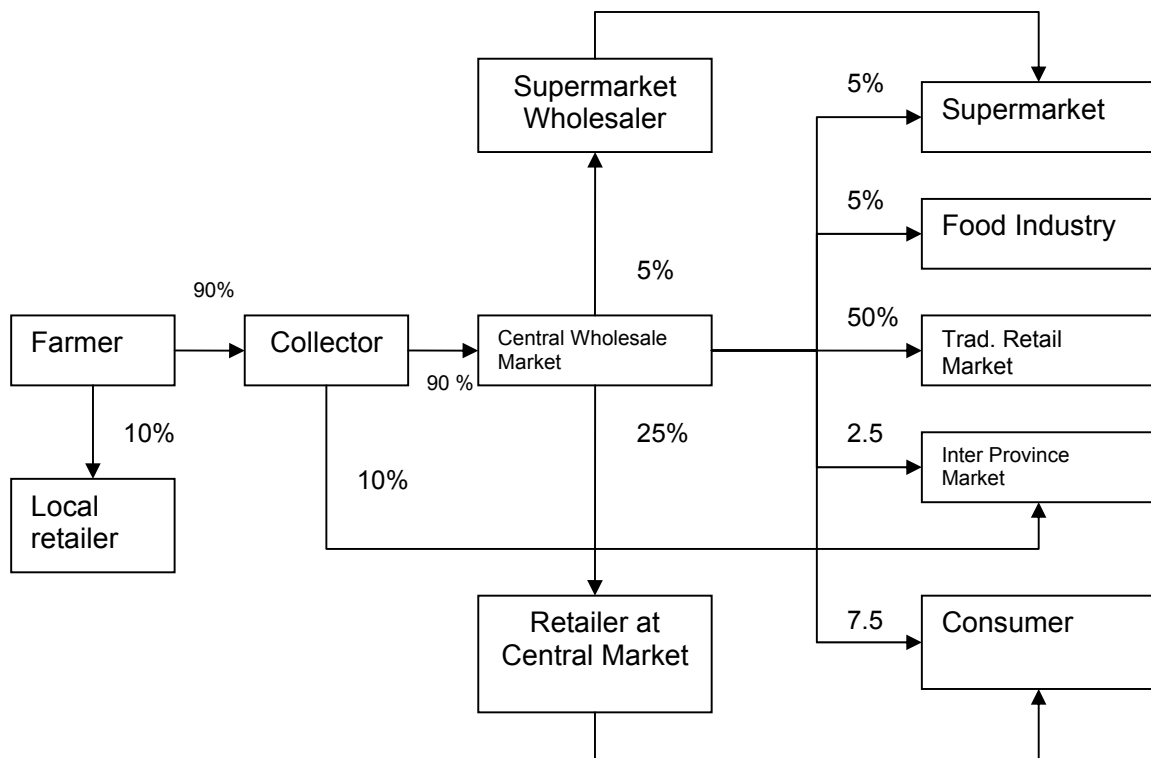


The localized nature of the supply chain gives farmers the opportunity to sell direct to the wholesaler at the central market (20%) and to local retailers (20%). The traditional wholesaler sells to retail market and a very small quantity goes to the supermarket (5-10 kg per day). There is only one modern supermarket in Kendari and the quantity required is considerably small, only 2-5 kg per day. Most supermarket customers are visitors to the region with the local community mostly buying food stuff from traditional markets.

A comparison with East Java

The supply chain in South Sulawesi (Figure 4) is very similar to the that in East Java (Figure 6). The two chains have diversified market destinations and products, which ensure its competitiveness. However, since East Java is one of the main chilli production zones in Indonesia, its trading volume is significantly higher than South Sulawesi. Both markets are part of the main Indonesian chilli market, where South Sulawesi has a more dominant role in Eastern Indonesian market. Improving the efficiency of South Sulawesi supply chain will have significant impact especially in the East Indonesian markets.

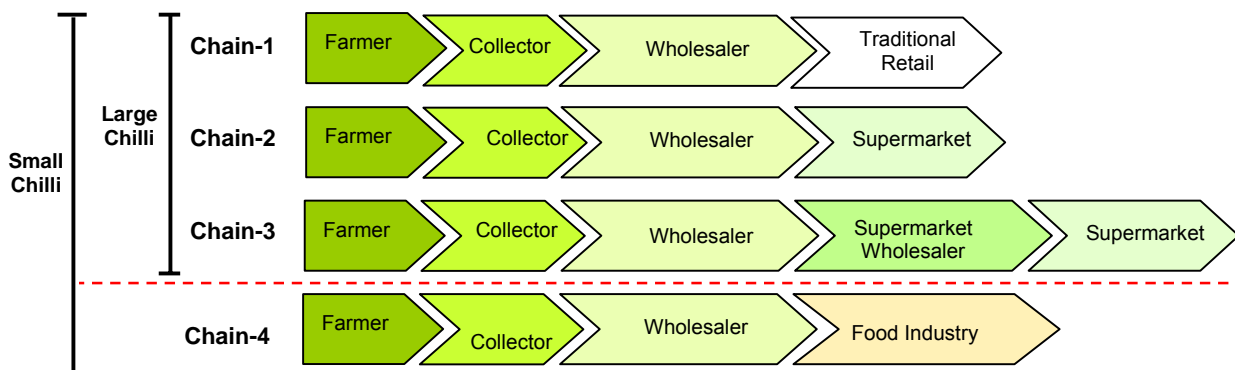
Figure 6. Marketing Channel of Chilli in East Java



Value Chain Analysis of Chilli

A value chain analysis of the different supply chains, outlined above, (Figures 5 and 6) was undertaken based on the most common channels that farmers sell their harvest and as a basis for comparison of traditional and modern chain. Thus the chains selected are:

Figure 7. Value Chain Map of Small Chilli and Large Chilli in Sulawesi

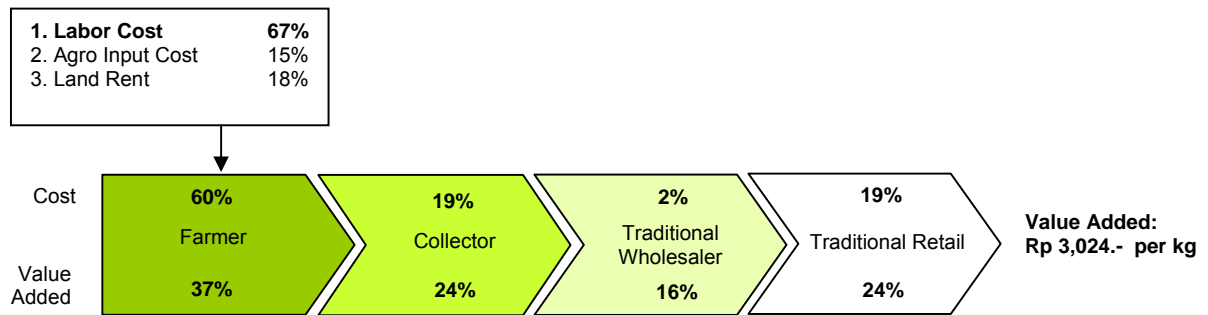


Chains 1 to 3 are of both small and large chilli and Chain 4 is only for small chilli. Out of four chains, one chain is going to a traditional market (small and large chilli), two chains are going to supermarket (small and large chilli) and one chain is going to a food industry (small chilli only).

Large chilli is also sold to the food industry, however, since large chilli is mixed with other materials in the process no information is currently available and is not included in the analysis.

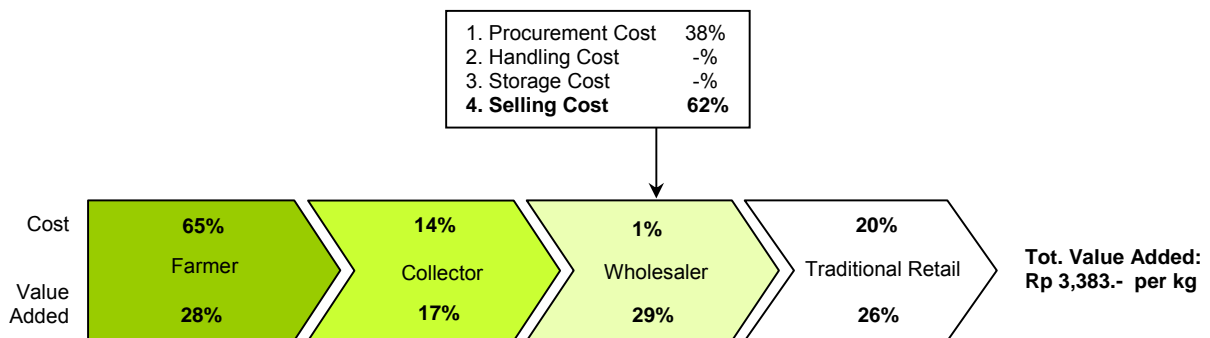
The following subsection is an analysis of value added distribution and cost for each different chain by type of chilli.

Chain 1(a) – small chilli to traditional retailers



The farmer sells chilli to a local collector at the field without grading. The collector then makes an offer to several wholesalers at Pasar Terong central market. After price agreement, the collector sends the chilli to the wholesale market. The whole chain creates a value added of Rp 3,024 per kg of small chilli and the total cost spent to create the value added is Rp 1,478 per kg. From the total value added, the farmer receives the highest share, 37% and spends the highest share on the cost side (60%). Small chilli farmers spend most of that cost on labour and other inputs to create the product. However, on the marketing channel to a traditional market, there is little cost spent to create a value added. Hence the value added created is small.

Chain 1(b) –large chilli to traditional retailers

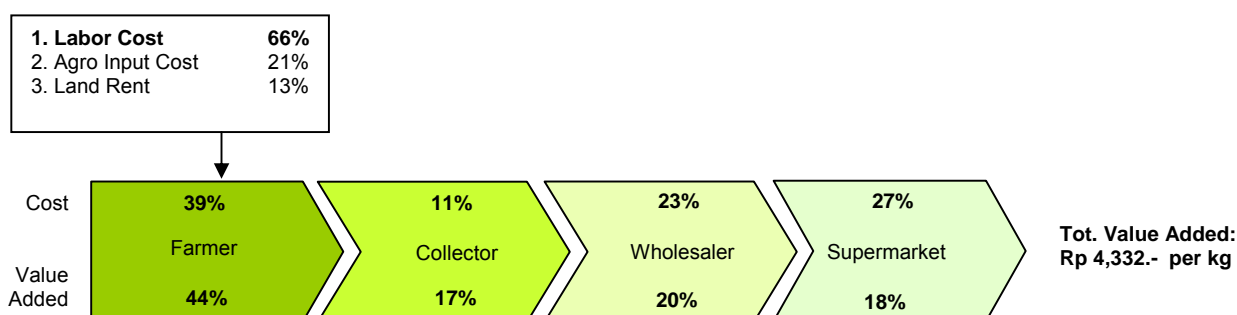


For large chilli, the chain to traditional retailers creates a value add of Rp 3,383 per kg for a total cost of Rp 3,117 per kg. Compared to small chilli, the value added created by large chilli is higher but also requires higher cost (twice as much). From the total value added created, the wholesaler receives the highest share of value added (29%). The farmer still receives a high share of value added (28%) but a lot less than the farmer’s share on small chilli. In contrast, a wholesaler with only a share of 1% from the chain total cost receives the highest share of value added. The wholesaler spent most of his operational cost on labour for product procurement and selling and delivering to the retail market.

The wholesaler has the largest differential between cost and value added and this may be explained by the fact that the wholesaler has more information and when the market price is fluctuating can use the information to gain a better bargaining position and price.

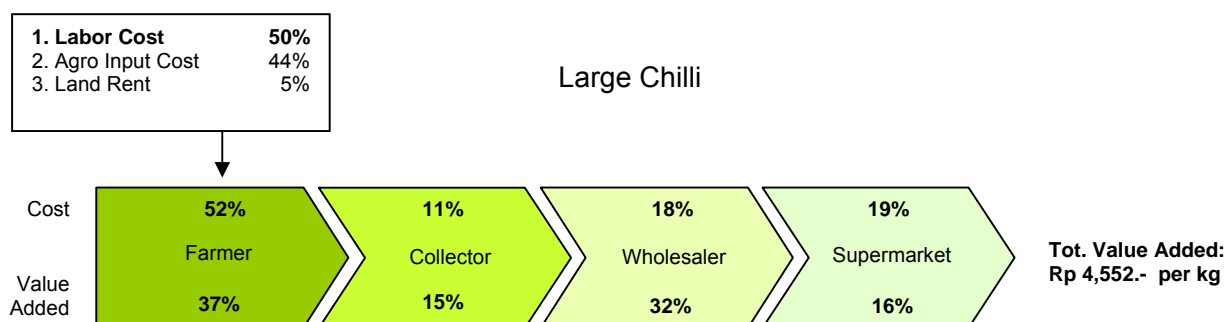
Chain 1a and 1b, to traditional retailers have only a small value added creation activity (the smallest among the four channels analyzed) as there is no storage, sorting, grading, packaging and labelling, and processing activities performed in the chain.

Chain 2(a) – small chilli to supermarket



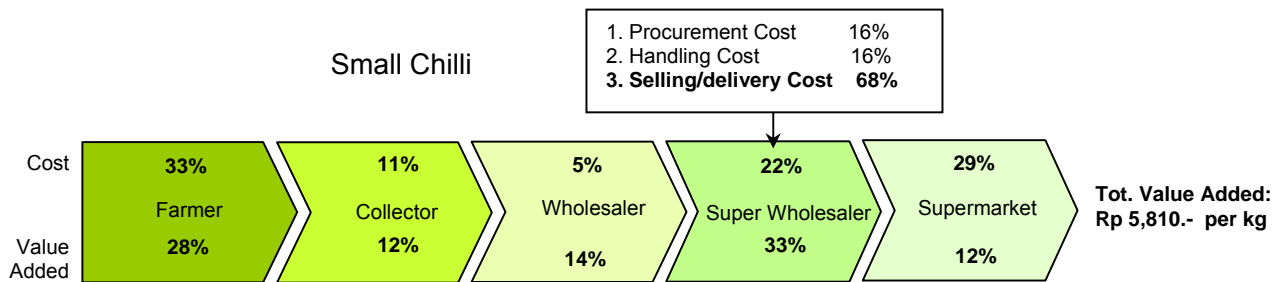
The farmer sells ungraded chilli to a local collector. The collector then grades and sell the highest quality chilli to a wholesaler. The wholesaler supplies only the highest quality to the supermarket. This second chain for small chilli creates value added of Rp 4,332 per kg for a total cost spend to create the value added at Rp 3,117 per kg. From the total value added created, the farmer receives the highest share of value added (44%). The small chilli farmer spends most of the cost on labour (66%) and other inputs to create the product. In this chain, the collector and wholesaler perform value added activities such as sorting, grading, and packaging. As a result, the chain creates higher value added than chain 1a.

Chain 2(b) – large chilli to supermarket



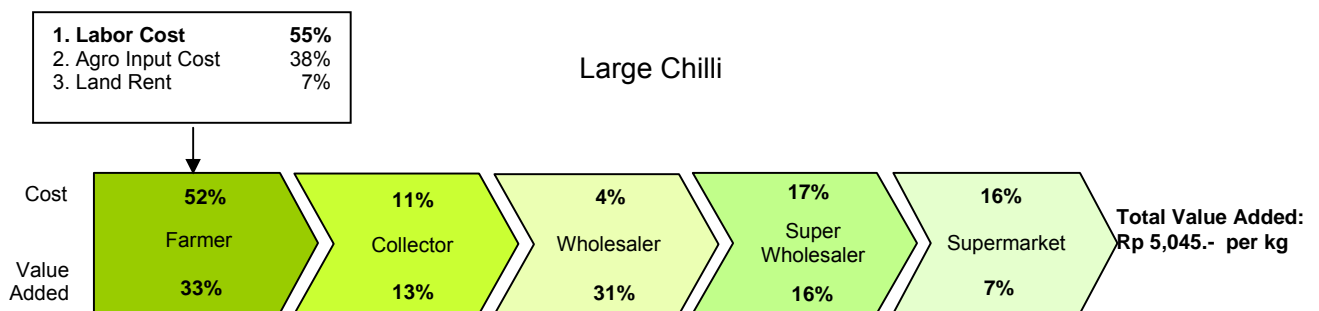
The second chain on large chilli creates value added of Rp 4,552 per kg for a total cost of Rp 4,046 per kg. From the total value added created, the farmer receives the highest share of value added (37%). However, farmer also has to spend Rp 2,101 per kg (52% of the chain cost) which is mostly spent on labour (50%) and other inputs. The collector and wholesaler of large chilli perform some marketing functions to create value added such as sorting, grading and packaging as requested by the supermarket. Total value added of large chilli on the Chain 2b is 34% higher then value added created by the Chain 1b (channel to traditional market).

Chain 3(a) – small chilli to supermarket, through speciality wholesaler



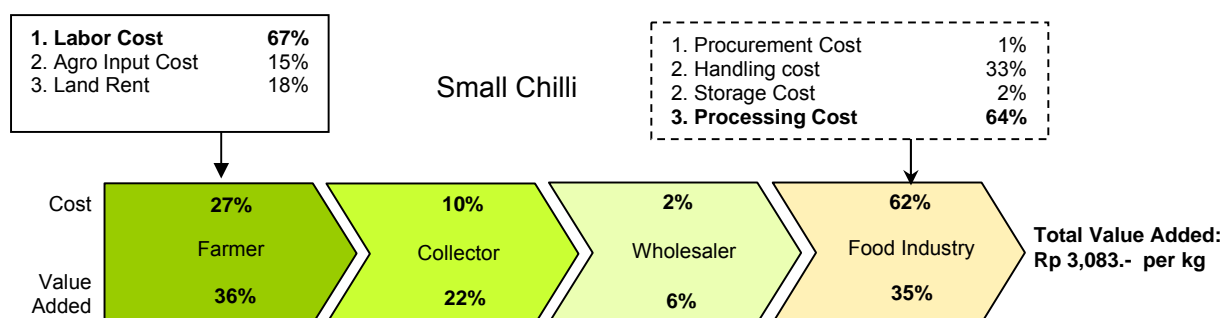
This chain creates value added of Rp 5,810 per kg of small chilli for a total cost of Rp 2,600 per kg. From the total value added created, the speciality wholesaler receives the highest share of value added (33%). However, this wholesaler has to spend Rp 604 per kg to create those value added (22% of the chain cost), mostly spent on the cost of selling/delivery (68%). Speciality wholesalers of small chilli requires the traditional wholesaler to perform some marketing function to create value added such as sorting, grading and packaging as requested by the supermarket. The farmer also gains a high share of value added (the second highest in this chain at 28%). The total value added of small chilli in Chain 3a is 92% higher than value added created by the channel to traditional market (Chain 1a).

Chain 3(b) – large chilli to supermarket, through speciality wholesaler



Chain 3(b) creates value added of Rp 5,045 per kg of large chilli for a total cost of Rp 3,935 per kg. From the total value added created, the farmer receives the highest share of value added (33%). However, the farmer also has to spend Rp 2,037 per kg (52% of the chain cost) which is mostly spent on labour (55%) and other inputs to create the product. The wholesaler of large chilli also performs some marketing function to create a value added such as sorting, grading and packaging which is requested by the supermarket. Total value added of large chilli through the Chain 3(b) is 49% higher than value added created by the channel to traditional market (Chain 1(b)).

Chain 4 – small chilli to food processing



Most of food industry companies that process chilli in South Sulawesi are small and medium enterprises (SME). The industry procure chilli from wholesalers in Makassar or close by kabupatens (regencies) rather than direct from farmers. The industry does not require high quality chilli since chilli is usually processed with other materials and used only as source of spice to create the hot taste, mostly for chilli sauce. Hence, issues such as consistency, continuity and product quality are not a major issue for the SME factories that use chilli in Sulawesi. Beside, the industry demand for chilli at present is still considered small.

The chain for the food industry creates a value added of Rp 3,083 per kg of small chilli for a total cost of value added of Rp 3,261 per kg. From the total value added, the farmer and the food processor receives the highest share of value added (36% and 35% respectively). The farmer has to spend Rp 881 per kg (27% of the chain cost) to create such a value added which mostly is spent on labour (67%) and other inputs to create the product. The industry, on the other hand, has spent the highest share on cost (62%) of Rp 2,014 per kg to produce chilli paste. Total value added of small chilli to a food industry is only 2% higher then value added created by the channel to traditional market.

Value Chain Analysis – Summary

In summary, value chain to supermarket gives the highest return to farmers because it contains value creation activities, such as applying efficient technology in cultivation and conducting post harvest handling.

The analysis of the four value chains shows that the highest value added chain is a channel to supermarket through supermarket wholesaler (Chain 1). Consistently, farmers received the highest return by supplying to the supermarket (Chain 1 and 2) compared to other channels. The lowest value added chain is a channel to traditional markets.

There is a need to assist farmers to link to more dynamic markets such as a channel to supermarket and food industry. Technical assistant to farmers is also needed on more efficient cultivation technology to increase productivity and applying post harvest handling.

9 Conclusions and recommendations

9.1 Indonesia has a large and diverse vegetable industry

Indonesia, with a population of 220 million people, is a major consumer and producer of vegetables. In 2005, Indonesia produced more than 9 million tons (excluding almost 31 million tons of mushrooms) and imported more than 370,000 tons of vegetables, mainly from China.

There are 33 provinces in Indonesia that produce over 20 types of vegetables. The main vegetables grown in Indonesia (besides mushrooms) are cabbages, chilli, potato, shallot/onions and tomato.

The major vegetable producing provinces are: West Java (36%), Central Java (13%), East Java (12%) and North Sumatra (10%); these four provinces account for over 70% of all vegetable production.

In Eastern Indonesia the provinces of North Sulawesi and South Sulawesi are the only major vegetable producers with 3.1% and 2.9% respectively of total Indonesian production.

9.2 Chilli has low input and productivity in Eastern Indonesia

Over 60% of chilli is produced in Java with West Java (198,000 tons) being the major source of large chilli and East Java (143,000 tons) being the major source of small chilli

South Sulawesi is a major producer of chilli (both small and large) but is inefficient in productivity (yield) whereas South East Sulawesi is ranked one of the smallest producers of both small and large chilli and lowest productivity.

South Sulawesi has unique climatic conditions which enables it to produce chilli all year round. Generally, chilli cultivation in South East Sulawesi is less intensive and therefore has lower productivity compared to South Sulawesi. Low production and productivity in South East Sulawesi of chilli (and other vegetables) is mainly due to climatic conditions (too warm) which makes the province unsuitable for large scale vegetable production.

Yields of large chilli in South Sulawesi and South East Sulawesi range from 4.9 tons and 2.2 tons per hectare respectively to 12.7 tons per hectare in west Java while yields of small chilli in South Sulawesi and Southeast Sulawesi range from 2.4 tons and 1.4 tons per hectare respectively to 11.8 tons per hectare in west Java.

Most of the chilli farmers in Sulawesi are small farmers operating on “low input” farming practices. There are minimal uses of chemicals and fertilizers. Whereas, in East Java, productivity is much higher due to application of fertilizers (nutrients) and better management practices.

There are opportunities to improve productivity of chilli and other vegetable farmers by introducing and adopting best practices which are being used in other provinces, such as West and East Java.

9.3 Processing and Value-adding Opportunities

Indonesian consumers consume large quantities when cooking (fresh chilli) or eating (fresh and chilli sauce). There are 10 major food companies in Indonesia that use chilli to manufacture sauces under brands such as Indofood, ABC, Sasa, Fina, Delmonte etc. All the major factories are located on the island of Java from Jakarta to Surabaya.

Major companies like ABC Heinz have a formal supply chain system with their suppliers to obtain the required product and quality at a fixed price. This is a closed supply chain system where a number of growers sign up with the manufacturer to supply a specified quantity and quality of chilli at an agreed price. The customer provides information, inputs (including seed) and technical support to their suppliers.

While, in Makassar (South Sulawesi) there are a number of small (PK) companies that manufacture chilli sauce for local uses at the lower end of the market (non branded). They buy their product from the market based on price not product specifications or quality.

Some small traders are drying chilli for sale to wet markets while others are adding value by processing (grinding) chilli and other ingredients into sauce for a charge of Rp 3,000 per bag (1-2 kg). The processing machine costs less than Rp 2 million. This offers an opportunity for a regional farmer group to purchase a machine to process the second class quality chilli or when prices are low and there is a need to store the product.

There are opportunities also to work with a major food processor (like ABC Heinz) or a local manufacturer to establish a supply chain with chilli growers in South Sulawesi for sauce.

9.4 Postharvest and Cool Chain Management

Chilli and other fresh vegetables have a short shelf life because of a lack of post harvest handling practices – no packaging or cool chain. Chilli and other vegetables (such as potato and cabbage) are packed into large sacks (up to 70 kgs) and loaded onto open trucks / buses where they are sent to markets. Product deterioration and wastage is a problem for the customer but little feedback is provided along the supply chain. There is a need for more suitable packaging to protect the product from farm to market, reduce damage and increase returns.

In Malino, a private company (PT Focus) has established a modern vertically integrated vegetable business involving a packing and cool-store facility with all the sorting, trimming and shrink wrapping occurring at the farm's packhouse. Modern machines are used for washing and sorting of carrots and potatoes. The product is sent to the major cities by refrigerated truck with less wastage and at a lower retail buying price than competitors. While this may be considered a closed supply chain, the company needs more supply and there is an opportunity of expanding the supplier base by involving a wider range of growers.

9.5 Distribution options are plenty

The port of Makassar is the major gateway port for Eastern Indonesia and there are over 280 registered exporters with 20% involved in refrigerated cargo business. However, most of the reefer containers are used for seafood. In addition, there are several other small ports that operate in South Sulawesi and ferry vegetables (by truck) to other islands, including Kendari

(South East Sulawesi) and Balikpapan (East Kalimantan). Produce is sent via truck or bus on these ferries.

The modern retailers in South Sulawesi all bring some supplies of fresh produce (including vegetables) by reefer container from Jakarta. Vegetables are also purchased from Surabaya in non refrigerated trucks. Major food distributors like Sukanda Jaya send up to 8 reefer containers (frozen) per month of imported and local food products from Jakarta for distribution to the food service and retail sectors.

Most of the farmers have their product picked up from the road side (by a collector) in an open truck and sent to the markets. There is no pre sorting or packing of produce on the farm. This compares with PT Focus, a modern packing shed, which sorts, packs and cools the produce before sending to their major customers by refrigerated trucks.

There is no modern central packing and warehouse facility in South Sulawesi, although at Malino there is an agribusiness sub-terminal, which is close to PT Focus modern packing and cool-store facility. This offers an opportunity of having discussions with major traders or collectors to gauge their interest in establishing a new supply chain using the agribusiness sub-terminal at Malino.

9.6 Market Development opportunities

There is a trend towards organic and hydroponic products with some companies in Java and Bali specializing in growing a wide range of vegetables to meet this consumer trend. The market is for branded product sold via the modern retail sector.

South East Sulawesi will open its first modern retail complex by 2010 and this will offer further opportunities for vegetable suppliers. Other provinces in Eastern Indonesia are expanding and also offer opportunities for suppliers of fresh vegetables, including chilli.

Import replacement is the initial opportunity in Eastern Indonesia as significant quantities of fresh vegetables are imported into South Sulawesi and other Eastern Indonesia provinces from Java due to lack of availability of supply and good quality produce.

9.7 Value Chain Analysis shows weak farmer bargaining power

Most of the growers are small farmers with less than one hectare of mixed farming. The farmer must sell his produce to receive some income and accepts the price offered by the collectors and traders. There is limited knowledge of selling prices in markets or trader profit margins. Profit sharing is inequitable and there is no market signals given to the farmers. There is a need to strengthen the farmer groups and to formalize a supply chain relationship between farmer and trader.

The value chain analysis of four supply chains showed that supermarket gives the highest return to farmers because it contains value creation activities, such as applying efficient technology in cultivation and conducting post harvest handling. The analysis of the four value chains shows that the highest value added chain is a channel to supermarket through supermarket wholesaler. Consistently, farmers received the highest return by supplying to the supermarket compared to other channels. The lowest value added chain is a channel to traditional markets. There is a need to assist farmers to link to more dynamic markets such as a channel to supermarket and food industry.

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11 Appendixes

11.1 Tables on Production, Exports and Imports

Table 1: Indonesia Vegetable Production in Tons, 2001 -2005

Commodities	Production (ton)				
	2001	2002	2003	2004	2005
Chilli	580,464	635,089	1,066,722	1,100,514	1,058,023
Onions	861,150	766,572	762,795	757,399	732,610
Potatoes	831,140	893,824	1,009,979	1,072,040	1,009,619
Tomatoes	483,991	573,517	657,459	626,872	647,020
Carrots	300,648	282,248	355,802	423,722	440,001
Cabbages	1,205,404	1,232,843	1,348,433	1,432,814	1,292,984
Others	2,656,827	2,760,652	3,373,679	3,646,315	3,921,729
TOTAL	6,919,624	7,144,745	8,574,869	9,059,676	9,101,986

Source : Ministry of Agriculture Directorate General Horticulture, 2006 (ISBN: 979-99060-4-0)

Table 2: Indonesia Harvested Area, Production & Yield of Vegetables, 2005

Description	Harvested Area	(%)	Production (Ton)	(%)	Yield (Ton/Ha)
Shallot	83,614	9.2	732,609	8.4	8.8
Garlic	3,280	0.4	20,733	0.2	6.3
Leek	45,402	5.0	501,437	5.7	11.0
Potato	61,557	6.8	1,009,619	11.6	16.4
Cabbage	57,765	6.3	1,292,984	14.8	22.4
Cauli Flower	8,763	1.0	127,320	1.5	14.5
Chinese Cabbage	51,785	5.7	548,453	6.3	10.6
Carrot	24,653	2.7	440,002	5.0	17.8
Chinese Radish	3,293	0.4	54,226	0.6	16.5
Red/Kidney Bean	34,545	3.8	132,218	1.5	3.8
Yardlong Bean	84,839	9.3	466,387	5.3	5.5
Chilli	103,531	11.4	661,730	7.6	6.4
Small Chilli	83,705	9.2	396,293	4.5	4.7
Tomato	51,205	5.6	647,020	7.4	12.6
Egg Plant/Aubergine	45,340	5.0	333,328	3.8	7.4
French Bean	32,254	3.5	283,649	3.2	8.8
Cucumber	53,109	5.8	552,891	6.3	10.4
Pumpkin/Chajota	9,569	1.0	180,029	2.1	18.8
Swamp Cabbage	36,184	4.0	229,997	2.6	6.4
Spinach	36,952	4.1	123,785	1.4	3.3
TOTAL	911,345	100.0	8,734,710	100.0	9.6
Mushroom	2,542,417	73.6	30,853,530	77.9	12.1
TOTAL	3,453,762	100.0	39,588,240	100.0	11.5

Source : Agricultural Survey Statistics of Vegetable and Fruit Plant Indonesia 2005

Table 3. Total of Indonesia's Exports of Selected Fresh Vegetables, by Value (US\$ '000) and Volume (Tonnes), 2005-2006

Commodity Description	2005		2006	
	Volume (Tonnes)	Value (US\$'000)	Volume (Tonnes)	Value (US\$'000)
Potatoes, Fresh or Chilled Seed	176	50	72	35
Potatoes, Fresh/Chilled other than Seed	13,644	3,527	85,922	5,917
Tomatoes	1,169	433	179	92
Onions	235	101	2,922	775
Shallots	4,259	1,520	15,701	6,366
Garlic	18	7	17	11
Leeks	108	32	54	39
Cauliflowers & Head Broccoli	3,186	927	1,696	438
Brussels Sprouts	142	53	16	7
Cabbages	34,352	7,910	30,045	7,903
Cabbage Lettuce	26	9	2	5
Mushrooms	2,644	2,385	1,089	1,033
Carrots	173	38	369	103
Asparagus	543	983	-	-
Celery	1	32	2	1
TOTAL	60,676	18,007	138,086	22,725

Source : The Indonesia Bureau of Statistics (BPS)

Table 4: Indonesia Vegetable Imports (in US\$'000)

Commodity	1994	2001	2002	2003	2004	2005
Potatoes, Fresh or Chilled Seed	873	584	808	455	454	1,010
Potatoes, Fresh/Chilled other than Seed	164	773	747	888	1,217	2,248
Tomatoes	210	178	552	255	98	142
Onions	2,572	3,508	3,685	3,695	5,058	6,751
Shallots	5,964	12,475	9,069	12,370	14,240	15,412
Garlic	22,673	51,217	52,298	48,900	53,303	66,665
Leeks	94	34	387	109	294	571
Cauliflowers & Head Broccoli	149	216	188	243	288	568
Brussels Sprouts	1	43	7	7	30	24
Cabbages	180	117	82	175	165	180
Cabbage Lettuce	271	128	129	173	132	224
Mushrooms	94	119	58	224	209	309
Carrots	86	289	495	691	1,708	3,043
Asparagus	3	52	10	12	58	90
Celery	118	137	187	253	185	722
TOTAL	33,452	69,868	68,702	68,450	77,439	97,958

Source: The Indonesian Bureau of Statistics (BPS)

Table 5: Indonesia Vegetable Imports (in tonnes)

Commodity	1994	2001	2002	2003	2004	2005
Potatoes, Fresh or Chilled Seed	866	1,136	1,436	676	683	1,360
Potatoes, Fresh/Chilled other than Seed	332	2,679	2,336	2,404	3,148	5,031
Tomatoes	219	227	1,711	380	120	125
Onions	6,340	12,964	12,913	12,343	17,385	22,133
Shallots	15,213	47,946	32,929	42,008	48,927	53,071
Garlic	29,626	205,470	226,085	218,538	243,721	283,283
Leeks	91	51	2,022	448	172	959
Cauliflowers & Head Broccoli	161	288	204	220	303	616
Brussels Sprouts	1	136	75	4	25	19
Cabbages	306	112	171	226	133	166
Cabbage Lettuce	175	106	142	171	274	240
Mushrooms	80	77	27	129	194	226
Carrots	104	476	1,262	1,623	5,239	7,030
Asparagus	2	171	9	9	38	67
Celery	138	122	144	166	142	155
TOTAL	53,652	271,961	281,465	279,345	320,505	374,482

Source : The Indonesian Bureau of Statistics (BPS)

Table 6: Harvested Area, Production and Yield of Vegetables 2005, Province South Sulawesi

Description	Harvested Area	(%)	Production (Ton)	(%)	Yield/Ha (Ton/Ha)
Shallot	2,381	4.4	12,081	4.7	5.1
Garlic	40	0.1	101	0.04	2.5
Leek	2,034	3.7	16,518	6.5	8.1
Potato	1,253	2.3	12,615	4.9	10.1
Cabbage	2,716	5.0	65,048	25.4	23.9
Cauli Flower	143	0.3	1,566	0.6	11.0
Chinese Cabbage	1,702	3.1	11,476	4.5	6.7
Carrot	796	1.5	7,113	2.8	8.9
Chinese Radish	0	0.0	0	0.0	0
Red/Kidney Bean	1,885	3.5	6,953	2.7	3.7
Yardlong Bean	5,974	11.0	20,205	7.9	3.4
Chilli	6,152	11.3	30,168	11.8	4.9
Small Chilli	3,840	7.0	9,395	3.7	2.4
Mushroom	0	0.0	0	0.0	0
Tomato	4,993	9.2	16,119	6.3	3.2
Egg Plant/Aubergin	6,251	11.5	11,634	4.5	1.9
French Bean	3,269	6.0	8,134	3.2	2.5
Cucumber	2,402	4.4	7,882	3.1	3.3
Pumpkin/Chajota	2,436	4.5	6,355	2.5	2.6
Swamp Cabbage	3,222	5.9	7,325	2.9	2.3
Spinach	3,049	5.6	5,049	2.0	1.8
TOTAL	54,538	100.0	255,737	100.0	

Table 7: Harvested Area, Production and Yield of Vegetables 2005, Province South East Sulawesi

Description	Harvested Area	(%)	Production (Ton)	(%)	Yield/Ha (Ton/Ha)
Shallot	108	1.4	418	1.2	3.9
Garlic	2	0.0	5	0.0	2.5
Leek	271	3.6	1,589	4.6	5.9
Potato	0	0.0	0	0.0	0
Cabbage	114	1.5	718	2.1	6.3
Cauli Flower	5	0.1	23	0.1	4.6
Chinese Cabbage	574	7.7	3,736	10.8	6.5
Carrot	0	0.0	0	0.0	0
Chinese Radish	8	0.1	17	0.0	2.1
Red/Kidney Bean	105	1.4	66	0.2	0.6
Yardlong Bean	1,221	16.4	5,505	15.9	4.5
Chilli	367	4.9	820	2.4	2.2
Small Chilli	518	6.9	718	2.1	1.4
Mushroom	0	0.0	0	0.0	0
Tomato	715	9.6	3,895	11.3	5.4
Egg Plant/Aubergin	760	10.2	6,379	18.4	8.4
French Bean	230	3.1	609	1.8	2.6
Cucumber	569	7.6	2,931	8.5	5.2
Pumpkin/Chajota	277	3.7	473	1.4	1.7
Swamp Cabbage	792	10.6	4,556	13.2	5.8
Spinach	822	11.0	2,119	6.1	2.6
TOTAL	7,458	100.0	34,577	100.0	

Table 8: Harvested Area, Production and Yield of Vegetables 2005, Province NTB

Description	Harvested Area	(%)	Production (Ton)	(%)	Yield/Ha (Ton/Ha)
Shallot	10,136	39.4	81,369	51.5	8.0
Garlic	655	2.5	6,440	4.08	9.8
Leek	9	0.0	66	0.0	7.3
Potato	33	0.1	307	0.2	9.3
Cabbage	355	1.4	3,541	2.2	10.0
Cauli Flower	10	0.0	27	0.0	2.7
Chinese Cabbage	199	0.8	1,167	0.7	5.9
Carrot	40	0.2	360	0.2	9.0
Chinese Radish	0	0.0	0	0.0	0.0
Red/Kidney Bean	337	1.3	324	0.2	1.0
Yardlong Bean	1,553	6.0	9,784	6.2	6.3
Chilli	549	2.1	1,867	1.2	3.4
Small Chilli	9,060	35.2	22,650	14.3	2.5
Mushroom	78	0.3	190	0.1	2.4
Tomato	1,048	4.1	10,499	6.6	10.0
Egg Plant/Aubergin	469	1.8	4,512	2.9	9.6
French Bean	92	0.4	148	0.1	1.6
Cucumber	504	2.0	5,670	3.6	11.3
Pumpkin/Chajota	84	0.3	1,680	1.1	20.0
Swamp Cabbage	377	1.5	6,560	4.2	17.4
Spinach	168	0.7	823	0.5	4.9
TOTAL	25,756	100.0	157,984	100.0	

Table 9: Harvested Area, Production and Yield of Vegetables 2005, Province NTT

Description	Harvested Area	(%)	Production (Ton)	(%)	Yield/Ha (Ton/Ha)
Shallot	852	7.6	3,837	7.6	4.5
Garlic	421	3.8	1,764	3.50	4.2
Leek	88	0.8	532	1.1	6.0
Potato	403	3.6	1,808	3.6	4.5
Cabbage	235	2.1	1,237	2.5	5.3
Cauli Flower	57	0.5	357	0.7	6.3
Chinese Cabbage	767	6.8	5,064	10.0	6.6
Carrot	281	2.5	1,817	3.6	6.5
Chinese Radish	4	0.0	29	0.1	7.3
Red/Kidney Bean	2,627	23.4	8,380	16.6	3.2
Yardlong Bean	910	8.1	2,119	4.2	2.3
Chilli	378	3.4	1,067	2.1	2.8
Small Chilli	644	5.7	1,491	3.0	2.3
Mushroom	0	0.0	0	0.0	0.0
Tomato	419	3.7	2,937	5.8	7.0
Egg Plant/Aubergin	499	4.5	3,422	6.8	6.9
French Bean	288	2.6	1,799	3.6	6.2
Cucumber	520	4.6	3,206	6.4	6.2
Pumpkin/Chajota	615	5.5	4,585	9.1	7.5
Swamp Cabbage	632	5.6	2,940	5.8	4.7
Spinach	564	5.0	2,022	4.0	3.6
TOTAL	11,204	100.0	50,413	100.0	

Table 10: List of Major Chilli Manufacturers in Indonesia

No	Company Name	Brand	City	Province
1	Indosentra Pelangi, PT	Indofood	Bekasi	West Java
2	Indosentra Pelangi , PT	Indofood	Semarang	Central Java
3	Lasallefood, PT	Delmonte	Jakarta	DKI Jakarta
4	Sekar Laut Tbk, PT	Fina	Sidoarjo	East Java
5	Ika Food Putramas, PT	Kokita	Bandung	West Java
6	Heinz ABC Indonesia, PT	ABC	Jakarta	DKI Jakarta
7	Heinz ABC Indonesia, PT	ABC	Karawang Timur	West Java
8	Mitratama Kencana Sejati, PT	Sasa	Bekasi	West Java
9	Merak Food Indrutries, PT	Soiz	Bandung	West Java
10	Lombok Gandaria, PT	Gandaria	Solo	Central Java
11	Rimbaria, PT	Rimbaria	Surabaya	East Java
12	Batara Agung Mulia, PT	Bahagia, Raja Rasa	Surabaya	East Java
13	PK. Sinar	-	Makassar	South Sulawesi

11.2 Farming Analysis of Small Chilli and Large Chilli in South Sulawesi and East Java

Prod. Factor	Unit	South Sulawesi				East Java			
		Small Chilli		Large Chilli		Small Chilli		Large Chilli	
		Amount (Per Ha)	Value (Rp/Ha)	Amount (Per Ha)	Value (Rp/Ha)	Amount (Per Ha)	Value (Rp/Ha)	Amount (Per Ha)	Value (Rp/Ha)
A. Agro Input									
1. Seed			212,500		600,000		150,000		600,000
a. Certified Seed	Pack	-	-	10	600,000	10	150,000	10.00	600,000
b. Local Seed (Uncertified)	Pack	25	212,500	-	-	-	-		-
2. Fertilizer			310,000		935,000		280,000		1,110,000
a. Chemical Fertilizer			310,000		310,000		280,000		1,110,000
- Urea	Kg	150	210,000	150	210,000	-	-		-
- SP-36	Kg	-	-		-	75	127,500	150	255,000
- KCl	Kg	50	100,00	50	100,000	50	70,000	300	420,000
- ZA	Kg	-	-		-	75	82,500	350	385,000
- KNO4	Kg	-	-		-	-	-	10	50,000
b. Organic Fertilizer	Kg	-	-	2,500	625,000	-	-		-
3. Pesticide			106,250		960,000		805,000		1,417,000
- Herbicide	L	-	-		-	3	120,000	7	280,000
- Fungicide	Kg	-	-	8	480,000	6	252,000	12	504,000
- Insecticide 1	L	2.5	106,250	16	480,000	4	148,000	4	148,000
- Insecticide 2	L	-	-		-	5	185,000	5	185,000
- Insecticide 3	L	-	-		-	0.1	100,000	0.3	300,000
4. Materials			-		500,000		17,500		2,952,500
a. Mulch	Roll	-	-		-	-	-	10	1,800,000
b. Long Stick	Batang	-	-	20,000	500,000	-	-	15,000	1,050,000
c. Short Stick	Batang	-	-		-	-	-	6	60,000
c. Seedling Polybag	Pack	-	-		-	10	17,500	10	17,500

Vegetable value chains in Eastern Indonesia—a focus on chilli

Prod. Factor	Unit	South Sulawesi				East Java			
		Small Chilli		Large Chilli		Small Chilli		Large Chilli	
		Amount (Per Ha)	Value (Rp/Ha)	Amount (Per Ha)	Value (Rp/Ha)	Amount (Per Ha)	Value (Rp/Ha)	Amount (Per Ha)	Value (Rp/Ha)
d. Plastic Rope	<i>Gulung</i>	-	-	-	-	-	-	5	25,000
Total Agro Input Cost	Rp/Ha	628,750		2,995,000		1,252,500		6,079,500	
B. Labor									
1. Seeding	HOK	2	40,000	2	40,000	-	-	-	486,000
<i>a. Seed preparation</i>	<i>HOK</i>	-	-	-	-	-	-	27	270,000
<i>b. Bed seeding</i>	<i>HOK</i>	-	-	-	-	-	-	12	216,000
2. Land preparation			500,000		620,000		2,300,000		2,300,000
<i>a. Ploughing</i>	<i>HOK</i>	25	500,000	25	500,000	60	600,000	60	600,000
<i>b. land rowing (guludan)</i>	<i>HOK</i>	-	-	6	120,000	170	1,700,000	170	1,700,000
3. Planting	HOK	15	262,500	15	225,000	15	150,000	20	400,000
4. Re-planting	HOK	14	280,000	15	300,000	4	40,000	8	80,000
5. Watering/irrigation	HOK	30	600,000	25	500,000	3	30,000	6	60,000
6. Pruning	HOK	-	-	-	-	-	-	25	250,000
7. Weeding	HOK	30	600,000	20	400,000	10	100,000	10	100,000
8. Fertilizing	HOK	8	160,000	30	600,000	45	450,000	107	1,070,000
9. Spraying	HOK	30	600,000	40	800,000	30	300,000	180	1,800,000
10. Plant Maintenance	HOK		-		600,000		-		1,110,000
<i>a. Mulching</i>	<i>HOK</i>		-		-		-	56	560,000
<i>b. Stick enforcing</i>	<i>HOK</i>		-	10	200,000		-	15	150,000
<i>c. Roping</i>	<i>HOK</i>		-	10	200,000		-	25	250,000
<i>d. Supporting</i>	<i>HOK</i>		-	10	200,000		-	15	150,000
11. Harvesting	HOK	45	787,500	60	1,200,000	30	300,000	120	1,200,000
Total Labor Cost	Rp/Ha	3,830,000		5,285,000		3,670,000		8,856,000	

Vegetable value chains in Eastern Indonesia—a focus on chilli

Prod. Factor	Unit	South Sulawesi				East Java			
		Small Chilli		Large Chilli		Small Chilli		Large Chilli	
		Amount (Per Ha)	Value (Rp/Ha)	Amount (Per Ha)	Value (Rp/Ha)	Amount (Per Ha)	Value (Rp/Ha)	Amount (Per Ha)	Value (Rp/Ha)
C. Land Rent	Ha	1	400,000	1	400,000	1	750,000	1	3,000,000
D. Depreciation			80,000		180,000		536,667		536,667
<i>a. Sprayer</i>	<i>unit</i>	1	30,000	1	30,000	5	300,000	5	300,000
<i>b. Hand plough</i>	<i>unit</i>	2	25,000	3	25,000	2	50,000	2	50,000
<i>c. Sabit</i>	<i>unit</i>	2	12,500	3	12,500	2	20,000	2	20,000
<i>d. Kored</i>	<i>unit</i>	2	12,500	2	12,500	2	16,667	2	16,667
<i>e. selang</i>	<i>rol</i>	-	-	1	100,000	1	150,000	1	150,000
Total Cost	Rp/Ha	4,898,750		8,860,000		6,209,167		18,472,167	
Production	Kg/Ha	3,000		3,700		5,000		15,000	
Selling Price	Rp/Kg	2,000		3,000		1,700		3,000	
Revenue	Rp/Ha	6,000,000		11,100,000		8,500,000		45,000,000	
Profit	Rp/Ha	1,061,250		2,240,000		2,290,833		26,527,833	

11.3 Comparison of Farming Activities and Technology in South Sulawesi and East Java

Description	South Sulawesi		East Java	
	Small Chilli	Large Chilli	Small Chilli	Large Chilli
Labor				
1. Land preparation				
- Cleaning and seeding	√	√	√	√
- Ploughing		√	√ *	√ *
- Drainaging		√	√	√
- Fertilizing (organic)		√		
- Land rowing		√	√	√
- Mulching		√		√
2. Maintenance				
- Replanting	√	√	√	√
- Stick enforcing		√		√
- Watering/irrigating	√	√	√	√
- Fertilizing		√	√	√
- Weeding	√	√	√	√
- Insect and disease control	√ **	√	√	√
3. Harvesting	√	√	√	√
Agro input				
1. Certified seed		√	√	√
2. Fertilizer				
- Urea		√		
- TSP			√	√
- KCl		√ ***	√	√
- ZA			√	√
3. Pesticide	√	√	√	√

*) Ploughing using tractors

***) Insect controlling is less intensive/ no prevention

***) Most farmers do not use KCl, only farmer in partnership with supermarket wholesaler use it

11.4 Summary of Small Chilli Value Chain

No.	Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret	Farm-Coll-Trad Whol-Superm	Farm- Coll - Trad Whol-Spr Whol-Superm	Farm-Coll-Trad Whol-F Ind
I	A. Farmers					
	Total Cost of Farmer	Rp/Kg	881	1,047	881	881
		%	60	39	33	27
	Value Added	Rp/Kg	1,119	1,927	1,634	1,119
		%	37	44	28	36
	Selling Price	Rp/Kg	2,000	2,974	2,516	2,000
II	Collector					
	Total Cost	Rp/Kg	284	292	284	314
		%	19	11	11	10
	Value Added	Rp/Kg	716	734	716	686
		%	24	17	12	22
	Selling Price	Rp/Kg	3,000	4,000	3,516	3,000
III	Traditional Wholesaler					
	Total Cost	Rp/Kg	29	614	146	37
		%	2	23	5	1
	Value Added	Rp/Kg	471	886	838	213
		%	16	20	14	7
	Selling Price	Rp/Kg	3,500	5,500	4,500	3,250
IV	Supermarket Wholesaler					
	Total Cost	Rp/Kg			604	
		%			22	
	Value Added	Rp/Kg			1,896	
		%			33	
	Selling Price	Rp/Kg			7,000	
V	Supermarket					
	Total Cost	Rp/Kg		715	775	
		%		27	29	
	Value Added	Rp/Kg		785	725	
		%		18	12	
	Selling Price	Rp/Kg		7,000	8,500	
VI	Traditional Retail					
	Total Cost	Rp/Kg	282			
		%	19			
	Value Added	Rp/Kg	718			
		%	24			
	Selling Price	Rp/Kg	4,500			
	Total Cost	Rp/Kg				2,017
		%				62
	Value Added	Rp/Kg				1,077
		%				35
	Selling Price	Rp/Kg				6,344
	Total Cost	Rp/Kg	1,476	2,668	2,690	3,249
	Total Value Added	Rp/Kg	3,024	4,332	5,810	3,095

Note: Farm=Farmer; Coll=Collector; Trd Whol=Traditional Wholesaler Market; Spr Whol= Supermarket Wholesaler; Trad Ret=Traditional Retail Market; Superm=Supermarket

11.5 Detail of Small Chilli Value Chain

Note: Farm=Farmer; Coll=Collector; Trd Whol=Traditional Wholesaler Market; Spr Whol= Supermarket Wholesaler; Trad Ret=Traditional Retail Market; Superm=Supermarket

No	Supply Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm- Coll - Trad Whol-Spr Whol-Superm		Farm-Coll-TradWhol-F Ind	
			Value	%	Value	%	Value	%	Value	%
IA	Farmers									
1	Labor Cost (family and hired)									
	a. Land preparation	Rp/Kg	175	30%	120	17%	175	30%	175	30%
	b. Fertilizer application	Rp/Kg			53	8%				
	c. Pesticide application	Rp/Kg	105	18%	200	29%	105	18%	105	18%
	d. Weeding	Rp/Kg	73	12%	61	9%	73	12%	73	12%
	e. Harvesting	Rp/Kg	234	40%	260	37%	234	40%	234	40%
	Total Labor Cost	Rp/Kg	587	67%	694	66%	587	67%	587	67%
2	Agro Input Cost									
	a. Seed	Rp/Kg	85	63%	71	32%	85	63%	85	63%
	b. Fertilizer	Rp/Kg			103	47%				
	c. Pesticide	Rp/Kg	43	32%	35	16%	43	32%	43	32%
	d. Stick, Plastic and other Input	Rp/Kg	7	5%	10	5%	7	5%	7	5%
	Total Input Cost	Rp/Kg	135	15%	220	21%	135	15%	135	15%
3	Land Rent	Rp/Kg	160	18%	133	13%	160	18%	160	18%
	Total Cost	Rp/Kg	881	60%	1,047	39%	881	33%	881	27%
4	Selling Price	Rp/Kg	2,000		2,974		2,516		2,000	
	Profit/Value Added	Rp/Kg	1,119	37%	1,927	44%	1,634	28%	1,119	36%
II	Collector									
1	Buying Price	Rp/Kg	2,000		2,974		2,516		2,000	
2	Procurement									
	a. Labor	Rp/Kg	21	27%	21	25%	21	27%	21	19%
	- Load-unload	Rp/Kg	15	73%	15	73%	15	73%	15	73%
	- Driver and Ass. Driver	Rp/Kg	6	27%	6	27%	6	27%	6	27%

No	Supply Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm- Coll - Trad Whol-Spr Whol-Superm		Farm-Coll-TradWhol-F Ind	
			Value	%	Value	%	Value	%	Value	%
	b. Equipment and Materials	Rp/Kg	28	35%	28	32%	28	35%	58	53%
	- Depreciation of scale	Rp/Kg	0.3	1%	0.3	1%	0	1%		
	- Package material	Rp/Kg	15	55%	15	55%	15	55%	15	27%
	- Depreciation of car	Rp/Kg	6	23%	6	23%	6	23%	6	11%
	- Operational cost of car	Rp/Kg	6	21%	6	21%	6	21%	36	62%
	c. Weight Loss	Rp/Kg	30	38%	38	43%	30	38%	30	28%
	d. Retribution	Rp/Kg						0%		
	Procurement Cost	Rp/Kg	79	28%	86	30%	79	28%	109	35%
3	Handling (Sorting, Grading, Packaging)									
	a. Labor	Rp/Kg			13	34%				
	b. Equipment and Materials	Rp/Kg			2	4%				
	- Depreciation of Container	Rp/Kg			0.3	15%				
	- Depreciation of Building	Rp/Kg			1	70%				
	- Depreciation of Scale	Rp/Kg			0.3	15%				
	b. Weight Loss	Rp/Kg			25	62%				
	Handling Cost	Rp/Kg			40	14%				
4	Storage									
	a. Equipment and Materials	Rp/Kg								
	- Depreciation of Building	Rp/Kg								
	Storage Cost	Rp/Kg					0	0%		
5	Delivery									
	a. Labor	Rp/Kg	15	8%	15	9%	15	8%	15	8%
	b. Equipment and Materials	Rp/Kg	150	73%	150	91%	150	73%	150	73%
	- Truck rental and operational	Rp/Kg	150	100%	150	100%	150	100%	150	100%
	- Package Material	Rp/Kg								
	c. Weight Loss	Rp/Kg	39	19%			39	19%	39	19%
	d. Retribution	Rp/Kg						0%		

No	Supply Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm- Coll - Trad Whol-Spr Whol-Superm		Farm-Coll-TradWhol-F Ind	
			Value	%	Value	%	Value	%	Value	%
	Delivery Cost	Rp/Kg	205	72%	165	57%	205	72%	205	65%
	Total Cost	Rp/Kg	284	19%	292	11%	284	11%	314	10%
6	Selling Price	Rp/Kg	3,000		4,000		3,516		3,000	
	Profit/Value Added	Rp/Kg	716	24%	734	17%	716	12%	686	22%
III	Traditional Wholesaler									
1	Buying Price		3,000		4,000		3,516		3,000	
2	Procurement									
	a. Labor		23	91%	99	98%	23	91%	23	92%
	- Load-unload	Rp/Kg	15	66%	99	100%	15	66%	15	66%
	- Scaling	Rp/Kg	8	34%			8	34%	8	34%
	b. Equipment and Materials		0.3	1.0%			0.3	1%		
	- Depreciation of scale	Rp/Kg	0.3	100%			0.3	100%		
	c. Retribution	Rp/Kg	2	8%	2	2%	2	8%	2	8%
	Procurement Cost	Rp/Kg	26	90%	100	16%	26	18%	25	49%
3	Handling (Sorting, Grading, Packaging)									
	a. Labor	Rp/Kg			83	75%	35	32%	15	100%
	b. Equipment and Materials	Rp/Kg			28	25%	60	68%		
	- Depreciation of Container	Rp/Kg			23	81%	0.2	0.3%		
	- Rag	Rp/Kg								
	- Plat	Rp/Kg								
	- Rent land/Building	Rp/Kg			5	16%				
	- sack	Rp/Kg								
	- Depreciation of scale	Rp/Kg			1	2%				
	-Packaging	Rp/Kg					15	20%	15	100%
	- Weight Loss	Rp/Kg					60	100%		
	Handling Cost	Rp/Kg	0.00	0%	112	18%	110.6	76%	15	30%
4	Storage									
	a. Labor	Rp/Kg								

No	Supply Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm- Coll - Trad Whol-Spr Whol-Superm		Farm-Coll-TradWhol-F Ind	
			Value	%	Value	%	Value	%	Value	%
	b. Equipment and Materials	Rp/Kg								
	- Depreciation of Building									
	- packaging	Rp/Kg								
	- Weight Loss	Rp/Kg								
	Storage Cost	Rp/Kg								
5	Delivery									
	a. Labor	Rp/Kg			83	21%				
	b. Equipment and Materials	Rp/Kg			44	11%	7	70%	11	100%
	-Packaging	Rp/Kg								
	- Truck	Rp/Kg			44	100%			11	100%
	- Ferry	Rp/Kg								
	- Depreciation of Scaling	Rp/Kg					7	100%		
	c. Weight Loss									
	d. Fee				275	68%				
	d. Retribution	Rp/Kg	3	100%			3	30%		
	Delivery Cost	Rp/Kg	3	10%	402	65%	10	7%	11	22%
	Total Cost	Rp/Kg	29	2%	614	23%	146	5%	52	2%
6	Selling Price	Rp/Kg	3,500		5,500		4,500		3,250	
	Profit/Value Added	Rp/Kg	471	16%	886	20%	838	14%	198	6%
IV	Supermarket Wholesaler									
1	Buying Price	Rp/Kg					4,500			
2	Procurement									
	a. Labor	Rp/Kg					35	35%		
	b. Equipment and Materials	Rp/Kg					15	16%		
	c. Fee	Rp/Kg						0%		
	d. Retribution	Rp/Kg					8	8%		
	e. Truck	Rp/Kg					41	41%		

No	Supply Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm- Coll - Trad Whol-Spr Whol-Superm		Farm-Coll-TradWhol-F Ind	
			Value	%	Value	%	Value	%	Value	%
	Procurement Cost	Rp/Kg					98	16%		
3	Handling (Sorting, Grading, Packaging)									
	a. Labor	Rp/Kg					26	27%		
	b. Equipment and Materials	Rp/Kg					25	26%		
	-Packaging	Rp/Kg					21	82%		
	-Depreciation of Scale	Rp/Kg					1	3%		
	-Building	Rp/Kg					4	15%		
	-Plat	Rp/Kg								
	-Land rent	Rp/Kg								
	b. Weight Loss	Rp/Kg					45	47%		
	b. Fee	Rp/Kg								
	Handling Cost	Rp/Kg					96	16%		
4	Storage									
	a. Labor	Rp/Kg								
	b. Equipment and Materials	Rp/Kg								
	-Depreciation of Building	Rp/Kg								
	-land Rent	Rp/Kg								
	-Depreciation of Packaging Material	Rp/Kg								
	c. Weight Loss	Rp/Kg								
	Storage Cost	Rp/Kg								
5	Delivery									
	a. Labor	Rp/Kg					19	32%		
	b. Equipment and Materials	Rp/Kg					41	68%		
	-Package Material	Rp/Kg								
	-Depreciation of Truck	Rp/Kg					16	38%		
	-Truck Operational cost	Rp/Kg					25	62%		
	Delivery Cost	Rp/Kg					60	10%		
6	Fee	Rp/Kg					350	58%		

No	Supply Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm- Coll - Trad Whol-Spr Whol-Superm		Farm-Coll-TradWhol-F Ind	
			Value	%	Value	%	Value	%	Value	%
	Total Cost	Rp/Kg					604	22%		
7	Selling Price	Rp/Kg					7,000			
	Profit/Value Added	Rp/Kg					1,896	33%		
V	Supermarket									
1	Buying Price	Rp/Kg			5,500		7,000			
2	Handling cost									
	a. Labor	Rp/Kg			240	34%	240	31%		
	b. Material	Rp/Kg			255	36%	255	33%		
	c. Weight Loss	Rp/Kg			220	31%	280	36%		
	Total Cost	Rp/Kg			715	27%	775	29%		
2	Selling Price	Rp/Kg			7,000		8,500			
	Profit/Value Added	Rp/Kg			785	18%	725	12%		
VI	Traditional Retail									
1	Buying Price	Rp/Kg	3,500							
2	Procurement									
	a. Labor	Rp/Kg	15	100%						
	b. Equipment and Materials	Rp/Kg								
	-Depreciation of Scale	Rp/Kg								
	-Truck Rental	Rp/Kg								
	c. Retribution	Rp/Kg								
	d. Weight Loss	Rp/Kg								
	Procurement Cost	Rp/Kg	15	5%						
3	Handling (Sorting, Grading, Packaging)									
	a. Labor	Rp/Kg	7	100%						
	b. Equipment and Materials	Rp/Kg	52	88%						

No	Supply Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm- Coll - Trad Whol-Spr Whol-Superm		Farm-Coll-TradWhol-F Ind	
			Value	%	Value	%	Value	%	Value	%
	- Depreciation of scale	Rp/Kg	2	4%						
	- Package material	Rp/Kg	50	96%						
	Handling Cost	Rp/Kg	59	21%						
4	Storage									
	a. Equipment and Materials	Rp/Kg	77	37%						
	-Storage Rent	Rp/Kg	77	100%						
	b. Retribution	Rp/Kg	23	11%						
	c. Weight loss	Rp/Kg	108	52%						
	Storage Cost	Rp/Kg	208	74%						
5	Delivery									
	a. Labor	Rp/Kg								
	b. Equipment and Materials	Rp/Kg								
	- Depreciation of scale	Rp/Kg								
	- Package material	Rp/Kg								
	Delivery Cost	Rp/Kg								
	Total Cost	Rp/Kg	282	19%						
6	Selling Price	Rp/Kg	4,500							
	Profit/Value Added	Rp/Kg	718	24%						
VII	Food Industry									
1	Buying Price	Rp/Kg							3,250	
2	Procurement									
	a. Labor	Rp/Kg							20	99%
	b. Equipment and Materials	Rp/Kg							0.2	1%
	-Depreciation of Scale	Rp/Kg							0.2	100%
	-Truck Rental	Rp/Kg								
	c. Retribution	Rp/Kg								
	d. Weight Loss	Rp/Kg								

No	Supply Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm- Coll - Trad Whol-Spr Whol-Superm		Farm-Coll-TradWhol-F Ind	
			Value	%	Value	%	Value	%	Value	%
	Procurement Cost	Rp/Kg							20	1%
3	Handling (Sorting, Grading, Packaging)									
	a. Labor	Rp/Kg							500	93.8%
	b. Equipment and Materials	Rp/Kg							1	0.1%
	b. Weight Loss	Rp/Kg							33	2%
	Handling Cost	Rp/Kg							533	26%
4	Processing Cost									
	a. Labor	Rp/Kg							60	4%
	b. Equipment and Materials	Rp/Kg							1,323	96%
	- Engine, Machine, Gerinda, and Belt	Rp/Kg							70	5%
	- Sack,	Rp/Kg							1	0.04%
	- Water fee	Rp/Kg							3	0.26%
	- Package	Rp/Kg							1,250	94%
	Processing Cost	Rp/Kg							1,383	69%
5	Storage									
	a. Labor	Rp/Kg							20	60%
	a. Equipment and Materials	Rp/Kg							2	7%
	-Storage Rent	Rp/Kg							2	100%
	b. Drum	Rp/Kg							11	34%
	c. Retribution	Rp/Kg								
	d. Weight loss	Rp/Kg								
	Storage Cost	Rp/Kg							33	2%
6	Processing									
	a. Labor	Rp/Kg							20	2%
	b. Equipment and Materials	Rp/Kg							1,250	96%
	- Engine	Rp/Kg							64	92%

No	Supply Chain Actor and Activities		Farm-Coll-Trad Whol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm- Coll - Trad Whol-Spr Whol-Superm		Farm-Coll-TradWhol-F Ind	
			Value	%	Value	%	Value	%	Value	%
	- Machine	Rp/Kg							2	2%
	- Gerinda	Rp/Kg							3	4%
	- Belt	Rp/Kg							1	1%
	- Package material	Rp/Kg							1,250	100%
	c. Retribution	Rp/Kg							1	0%
	d. Truck Rent	Rp/Kg							27	2%
	Processing Cost	Rp/Kg							1,298	64%
	Total Cost	Rp/Kg							2,014	62%
7	Selling Price	Rp/Kg							6,344	
	Profit/Value Added	Rp/Kg							1,080	35%
	Farmer share	%	44%		42%		30%		32%	
	Total Value Added	Rp/Kg	3,027	100%	4,332	100%	5,849	100%	3,082	65%
	Total Cost	Rp/Kg	1,473	100%	2,668	100%	2,651	100%	3,262	38%

11.6 Summary of Large Chilli Value Chain

Note: Farm=Farmer; Coll=Collector; Trd Whol=Traditional Wholesaler Market; Spr Whol= Supermarket Wholesaler; Trad Ret=Traditional Retail Market; Superm=Supermarket

No.	Chain Actor and Activities		Farm-Coll- TradWhol- Trad Ret	Farm-Coll- Trad Whol- Superm	Farm-Coll- Trad Whol- Supr Whol- Superm
I	Farmers				
	Total Cost of Farmer	Rp/Kg	2,037	2,101	2,037
		%	65	52	58
	Value Added	Rp/Kg	963	1,683	1,671
		%	28.4	38	31
	Selling Price	Rp/Kg	3,000	3,784	3,708
II	Collector				
	Total Cost	Rp/Kg	418	425	425
		%	13	11	12
	Value Added	Rp/Kg	582	686	664
		%	17	15	12
	Selling Price	Rp/Kg	4,000	4,895	4,797
III	Traditional Wholesaler				
	Total Cost	Rp/Kg	35	727	154
		%	1	18	4
	Value Added	Rp/Kg	965	1,378	1,549
		%	28.5	31	28
	Selling Price	Rp/Kg	5,000	7,000	6,500
IV	Supermarket Wholesaler				
	Total Cost	Rp/Kg			294
		%			8
	Value Added	Rp/Kg			1,206
		%			22
	Selling Price	Rp/Kg			8,000
V	Supermarket				
	Total Cost	Rp/Kg		775	650
		%		19	18
	Value Added	Rp/Kg		725	350
		%		16	6
	Selling Price	Rp/Kg		8,500	9,000
VI	Traditional Retail				
	Total Cost	Rp/Kg	621		
		%	20		
	Value Added	Rp/Kg	879		
		%	26		
	Selling Price	Rp/Kg	6,500		
VII	Food Industry				
	Total Cost	Rp/Kg			
		%			
	Value Added	Rp/Kg			
		%			
	Selling Price	Rp/Kg			
	TOTAL COST	Rp/Kg	3,111	4,028	3,560
	TOTAL VALUE ADDED	Rp/Kg	3,389	4,472	5,440

11.7 Detail of Large Chilli Value Chain

Note: Farm=Farmer; Coll=Collector; Trd Whol=Traditional Wholesaler Market; Spr Whol= Supermarket Wholesaler; Trad Ret=Traditional Retail Market; Superm=Supermarket

No	Supply Chain Actor and Activities		Farm-Coll-TradWhol- Trad Ret		Farm-Coll-Trad Whol- Superm		Farm-Coll-Trad Whol- Supr Whol-Superm	
			Value	%	Value	%	Value	%
IA	Farmers							
1	Labor Cost (family and hired)							
	a. Land preparation	Rp/Kg	193	17%	250	24%	193	17%
	b. Fertilizer application	Rp/Kg	133	12%	162	15%	133	12%
	c. Pesticide application	Rp/Kg	296	27%	216	20%	296	27%
	d. Weeding	Rp/Kg	156	14%	189	18%	156	14%
	e. Harvesting	Rp/Kg	333	30%	243	23%	333	30%
	Total Labor Cost	Rp/Kg	1,111	55%	1,061	50%	1,111	55%
2	Agro Input Cost							
	a. Seed	Rp/Kg	222	29%	162	17%	222	29%
	b. Fertilizer	Rp/Kg	309	40%	347	37%	309	40%
	c. Pesticide	Rp/Kg	37	5%	270	29%	37	5%
	d. Stick, Plastic and other Input	Rp/Kg	209	27%	153	16%	209	27%
	Total Input Cost	Rp/Kg	778	38%	933	44%	778	38%
3	Land Rent	Rp/Kg	148	7%	108	5%	148	7%
	Total Cost	Rp/Kg	2,037	65%	2,101	52%	2,037	52%
4	Selling Price	Rp/Kg	3,000		3,784		3,708	
	Profit/Value Added	Rp/Kg	963	28%	1,683	37%	1,671	33%
II	Collector		Value	%	Value	%	Value	%
1	Buying Price	Rp/Kg	3,000		3,784		3,708	
2	Procurement							

No	Supply Chain Actor and Activities		Farm-Coll-TradWhol- Trad Ret		Farm-Coll-Trad Whol- Superm		Farm-Coll-Trad Whol- Supr Whol-Superm	
			Value	%	Value	%	Value	%
	a. Labor	Rp/Kg	24	64%	24	64%	24	64%
	- Load-unload	Rp/Kg	15	63%	15	63%	15	63%
	- Driver and Ass. Driver	Rp/Kg	9	37%	9	37%	9	37%
	b. Equipment and Materials	Rp/Kg	12	32%	12	32%	12	32%
	- Depreciation of scale	Rp/Kg	0.1	1%	0.1	1%	0.1	1%
	- Package material	Rp/Kg	0.1	1%	0.1	1%	0.1	1%
	- Depreciation of car	Rp/Kg	6	51%	6	51%	6	51%
	- Operational cost of car	Rp/Kg	6	47%	6	47%	6	47%
	c. Weight Loss	Rp/Kg						
	d. Retribution	Rp/Kg	2	4%	2	4%	2	4%
	Procurement Cost	Rp/Kg	38	9%	38	9%	38	9%
3	Handling (Sorting, Grading, Packaging)							
	a. Labor	Rp/Kg	13	30%	20	39%	20	39%
	b. Equipment and Materials	Rp/Kg	2	4%	2	3%	2	3%
	- Depreciation of Container	Rp/Kg	0.3	17%	0.3	20%	0.3	20%
	- Depreciation of Building	Rp/Kg	1	77%	1	74%	1	74%
	- Depreciation of Scale	Rp/Kg	0.1	7%	0.1	6%	0.1	6%
	b. Weight Loss	Rp/Kg	30	67%	30	58%	30	58%
	Handling Cost	Rp/Kg	45	10%	52	12%	52	12%
4	Storage							
	a. Equipment and Materials	Rp/Kg						
	- Depreciation of Building	Rp/Kg						
	Storage Cost	Rp/Kg						
5	Delivery							
	a. Labor	Rp/Kg	20	6%	20	6%	20	6%
	b. Equipment and Materials	Rp/Kg	250	75%	250	75%	250	75%

No	Supply Chain Actor and Activities		Farm-Coll-TradWhol- Trad Ret		Farm-Coll-Trad Whol- Superm		Farm-Coll-Trad Whol- Supr Whol-Superm	
			Value	%	Value	%	Value	%
	- Truck rental and operational	Rp/Kg	250	100%	250	100%	250	100%
	- Package Material	Rp/Kg						
	c. Weight Loss	Rp/Kg	59	18%	59	18%	59	18%
	d. Retribution	Rp/Kg	5	1%	5	1%	5	1%
	Delivery Cost	Rp/Kg	334	80%	334	79%	334	79%
	Total Cost	Rp/Kg	418	13%	425	11%	425	12%
6	Selling Price	Rp/Kg	4,000		4,895		4,797	
	Profit/Value Added	Rp/Kg	582	17%	686	15%	664	12%
III	Wholesaler (General and Traditional)		Value	%	Value	%	Value	%
1	Buying Price		4,000		4,797		4,797	
2	Procurement							
	a. Labor		19	92%	15	85%	7	78%
	- Load-unload	Rp/Kg	13		15	100%		
	- Scalling	Rp/Kg	7	35%			7	100%
	b. Equipment and Materials		0.3	1%	0.2	1%	0.3	3%
	- Depreciation of scale	Rp/Kg	0.3	100%	0.2	100%	0.3	100%
	c. Retribution	Rp/Kg	2	8%	3	14%	2	19%
	Procurement Cost	Rp/Kg	21	60%	18	2%	9	6%
3	Handling (Sorting, Grading, Packaging)							
	a. Labor	Rp/Kg			60	33%	35	27%
	b. Equipment and Materials	Rp/Kg			121	67%	96	73%
	- Depreciation of Container	Rp/Kg			0.4	0.3%		
	- Rag	Rp/Kg						
	- Plat	Rp/Kg						
	- Rent land/Building	Rp/Kg			7	6%		

No	Supply Chain Actor and Activities		Farm-Coll-TradWhol- Trad Ret		Farm-Coll-Trad Whol- Superm		Farm-Coll-Trad Whol- Supr Whol-Superm	
			Value	%	Value	%	Value	%
	- sack	Rp/Kg					0.3	0.3%
	- Depreciation of scale	Rp/Kg			0.2	0.1%	0.5	0%
	-Packaging	Rp/Kg			23	19%	15	
	- Weight Loss	Rp/Kg			90	75%	80	83%
	Handling Cost	Rp/Kg			181	25%	131	85%
4	Storage							
	a. Labor	Rp/Kg						
	b. Equipment and Materials	Rp/Kg						
	- Depreciation of Building							
	- packaging	Rp/Kg						
	- Weight Loss	Rp/Kg						
	Storage Cost	Rp/Kg						
5	Delivery							
	a. Labor	Rp/Kg	13	88%	125	24%	13	88%
	b. Equipment and Materials	Rp/Kg			53	10%	0	0%
	-Packaging	Rp/Kg						
	- Truck	Rp/Kg			53	100%		
	- Ferry	Rp/Kg						
	- Depreciation of Scalling	Rp/Kg						
	c. Weight Loss				350	66%		
	d. Fee							
	d. Parking	Rp/Kg	2	12%			2	6%
	Delivery Cost	Rp/Kg	14	40%	528	73%	30	19%
	Total Cost	Rp/Kg	35	1%	727	18%	154	4%
6	Selling Price	Rp/Kg	5,000		7,000		6,500	
	Profit/Value Added	Rp/Kg	965	28%	1,378	31%	1,549	31%

No	Supply Chain Actor and Activities		Farm-Coll-TradWhol- Trad Ret		Farm-Coll-Trad Whol- Superm		Farm-Coll-Trad Whol- Supr Whol-Superm	
			Value	%	Value	%	Value	%
IV	Super Wholesaler		Value	%	Value	%	Value	%
1	Buying Price	Rp/Kg					6,500	
2	Procurement							
	a. Labor	Rp/Kg					35	82%
	b. Equipment and Materials	Rp/Kg						
	c. Fee	Rp/Kg						
	d. Retribution	Rp/Kg					8	18%
	e. Truck	Rp/Kg						
	Procurement Cost	Rp/Kg					42	6%
3	Handling (Sorting, Grading, Packaging)							
	a. Labor	Rp/Kg					20	73%
	b. Equipment and Materials	Rp/Kg					31	42%
	-Packaging	Rp/Kg					0.4	1%
	-Depreciation of Scale	Rp/Kg					0.2	1%
	-Building	Rp/Kg					7	23%
	-Plat	Rp/Kg						
	-Land rent	Rp/Kg						
	-Packaging	Rp/Kg					23	75%
	b. Weight Loss	Rp/Kg						
	Handling Cost	Rp/Kg					74	25%
4	Storage							
	a. Labor	Rp/Kg						
	b. Equipment and Materials	Rp/Kg						
	-Depreciation of Building	Rp/Kg						
	-Dland Rent	Rp/Kg						

No	Supply Chain Actor and Activities		Farm-Coll-TradWhol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm-Coll-Trad Whol-Supr Whol-Superm	
			Value	%	Value	%	Value	%
	-Depreciation of Packaging Material	Rp/Kg						
	c. Weight Loss	Rp/Kg						
	Storage Cost	Rp/Kg						
5	Delivery							
	a. Labor	Rp/Kg					125	70%
	b. Equipment and Materials	Rp/Kg					53	30%
	-Package Material	Rp/Kg					0	0%
	-Depreciation of Truck	Rp/Kg					9	18%
	-Truck Operational cost	Rp/Kg					44	82%
	Delivery Cost	Rp/Kg					178	61%
6	Fee	Rp/Kg						
	Total Cost	Rp/Kg					294	8%
7	Selling Price	Rp/Kg					8,000	
	Profit/Value Added	Rp/Kg					1,206	22%
V	Supermarket		Value	%	Value	%	Value	%
1	Buying Price	Rp/Kg			7,000		8,000	
2	Handling cost							
	a. Labor	Rp/Kg			240	31%	160	25%
	b. Material	Rp/Kg			255	33%	170	26%
	c. Weight Loss	Rp/Kg			280	36%	320	
	Total Cost	Rp/Kg			775	19%	650	16%
2	Selling Price	Rp/Kg			8,500		9,000	
	Profit/Value Added	Rp/Kg			725	16%	350	6%
VI	Traditional Retail Market		Value	%	Value	%	Value	%

No	Supply Chain Actor and Activities		Farm-Coll-TradWhol- Trad Ret		Farm-Coll-Trad Whol- Superm		Farm-Coll-Trad Whol- Supr Whol-Superm	
			Value	%	Value	%	Value	%
1	Buying Price	Rp/Kg	5,000					
2	Procurement							
	a. Labor	Rp/Kg	15	100%				
	b. Equipment and Materials	Rp/Kg						
	-Depreciation of Scale	Rp/Kg						
	-Truck Rental	Rp/Kg						
	c. Retribution	Rp/Kg						
	d. Weight Loss	Rp/Kg						
	Procurement Cost	Rp/Kg	15	2%				
3	Handling (Sorting, Grading, Packaging)							
	a. Labor	Rp/Kg	35	41%				
	b. Equipment and Materials	Rp/Kg	52	38%				
	- Depreciation of scale	Rp/Kg	2	4%				
	- Package material	Rp/Kg	50	96%				
	c. Weight Loss	Rp/Kg	50	37%				
	Handling Cost	Rp/Kg	137	22%				
4	Storage							
	a. Equipment and Materials	Rp/Kg	75	16%				
	-Storage Rent	Rp/Kg	75	100%				
	b. Retribution	Rp/Kg	9	2%				
	c. Weight loss	Rp/Kg	385	82%				
	Storage Cost	Rp/Kg	469	75%				
5	Delivery							
	a. Labor	Rp/Kg						
	b. Equipment and Materials	Rp/Kg						
	- Depreciation of scale	Rp/Kg						

No	Supply Chain Actor and Activities		Farm-Coll-TradWhol-Trad Ret		Farm-Coll-Trad Whol-Superm		Farm-Coll-Trad Whol-Supr Whol-Superm	
			Value	%	Value	%	Value	%
	- Package material	Rp/Kg						
	Delivery Cost	Rp/Kg						
	Total Cost	Rp/Kg	621	20%				
6	Selling Price	Rp/Kg	6,500					
	Profit/Value Added	Rp/Kg	879	26%				
VII	Food Industry							
1	Buying Price	Rp/Kg						
2	Procurement							
	a. Labor	Rp/Kg						
	b. Equipment and Materials	Rp/Kg						
	-Depreciation of Scale	Rp/Kg						
	-Truck Rental	Rp/Kg						
	c. Retribution	Rp/Kg						
	d. Weight Loss	Rp/Kg						
	Procurement Cost	Rp/Kg						
3	Handling (Sorting, Grading, Packaging)							
	a. Labor	Rp/Kg						
	b. Equipment and Materials	Rp/Kg						
	- Engine	Rp/Kg						
	- Machine	Rp/Kg						
	- Grinder	Rp/Kg						
	- Belt	Rp/Kg						
	- Sack	Rp/Kg						
	b. Weight Loss	Rp/Kg						
	Handling Cost	Rp/Kg						

No	Supply Chain Actor and Activities		Farm-Coll-TradWhol- Trad Ret		Farm-Coll-Trad Whol- Superm		Farm-Coll-Trad Whol- Supr Whol-Superm	
			Value	%	Value	%	Value	%
4	Storage							
	a. Labor	Rp/Kg						
	a. Equipment and Materials	Rp/Kg						
	-Storage Rent	Rp/Kg						
	b. Drum	Rp/Kg						
	c. Retribution	Rp/Kg						
	d. Weight loss	Rp/Kg						
	Storage Cost	Rp/Kg						
5	Delivery							
	a. Labor	Rp/Kg						
	b. Equipment and Materials	Rp/Kg						
	- Depreciation of scale	Rp/Kg						
	- Package material	Rp/Kg						
	c. Retribution	Rp/Kg						
	d. Truck Rent	Rp/Kg						
	Delivery Cost	Rp/Kg						
	Total Cost	Rp/Kg						
6	Selling Price	Rp/Kg						
	Profit/Value Added	Rp/Kg						
	Farmer share	%	46%		45%		41%	
	Total Value Added	Rp/Kg	3,319	100%	4,472	100%	5,440	100%
	Total Cost	Rp/Kg	3,181	100%	4,028	100%	3,560	100%