

## **AN EXPLORATORY STUDY OF TOMATO MARKETING IN EAST JAVA**

**Kuntoro Boga Andri<sup>1</sup>, Tiago Wandschneider<sup>2</sup> and Teddy Kristedy<sup>3</sup>**

<sup>1</sup>BPTP East Java, Indonesian Agency for Agriculture Research and Development, Minister of Agriculture, Malang, Indonesia;  
Email: kuntoro@gmail.com

<sup>2</sup>Agribusiness and Development Expert – Lisbon, Portugal;

<sup>3</sup>The ACIAR Project Coordinator for Eastern Indonesia Agribusiness Development Opportunities (EI-ADO), Denpasar, Indonesia.

### **ABSTRACT**

Tomato is an important source of income for many vegetable farm households in East Java. These households can generally be classified as resource-poor. This study was conducted to provide a description and analysis of the tomato marketing in East Java. Some information and analysis of the tomato chain are also provided due to the close links between tomato production and marketing. A review of existing studies, reports, and government statistics was carried out early on during the research and qualitative methods were employed for collection of primary data. The fieldwork was carried out during December 2012 to March 2013 in using Focus group discussions (FGD) with farmers and semi-structured interviews (SSI) with producers, other chain actors, and some knowledgeable observers in Graet Malang and its tomato marketing areas in East Java. This study shows the productivity of tomato in Malang is still below the level of potential. Some production constraints encountered due endemic pests and diseases as well as quality of seed. Besides, post-harvest handling is also less of a concern because it is still traditional. Thus there are still opportunities to be able to increase the production of tomato by improving seed genetic resources and farming technologies. Government support is needed for the provision of warehouse facilities in strategic markets and improved transportation facilities to maintain the quality.

### **Keywords**

*tomato marketing, value chain analysis, cultivation practices, East Java*

### **INTRODUCTION**

Tomato is an important source of income for many vegetable farm households in East Java. These households can generally be classified as resource-poor. Most have one hectare or less under a rotation of different vegetables. These farms are a major source of household income

(Darmawan and Pasandaran, 2000; Johnson, et al, 2008). Vegetable farm households are not income-poor, however, tomato and other vegetables are high-value crops (Menegay and Darmono 2007). The levels of investment and risk associated with the production of these crops are beyond the capacity of very poor households (Genova et al, 2013). On the

other hand, it should be noted that many vegetable growers in Malang were once poor. For them, gradual diversification into vegetable cultivation enabled them to move up the income ladder.

Tomato farms are also an important source of wage income. Tomato is a very labor-intensive crop, and most of the labor input is provided by casual farm workers, not members of the farm household. These workers are amongst the poorest actors in the tomato chain. Most have marginal or no landholdings. Casual farm work is critical for their livelihood (Armenia, et al, 2013).

Farm households in East Java operate in a land-scarce context. The opportunities for increasing agricultural income through expansion of cultivated areas are very limited. In order to improve income, farm households will need to develop more productive (profitable) farm businesses. This can be achieved through a reduction in production costs per unit of output, higher prices for current crops, or diversification to more profitable crops.

## **METHODOLOGY AND APPROACH**

Field work was conducted in the months of November 2012 to March 2013. Existing studies, reports, and official statistics were reviewed early on during the research process to evaluate the information available and identify data gaps. Daily wholesale price data for 2009-2011 was obtained from the Management Board of Pare market in Kediri, an important agricultural trading center in East Java. Most of the study was spent in Malang and Batu districts interviewing key informants in the tomato farm and trading enterprises, specifically targeting export and

niche domestic markets. A few days were spent in Surabaya interviewing traditional wholesalers and retailers and visiting modern retail outlets. Some of the interviews involved key informants in the tomato chain.

The study covers a wide range of issues deemed important for an understanding the structure, conduct and performance of the tomato value chain in East Java, its potential as a vehicle for poverty reduction, and the opportunities and incentives for chain upgrading. Analysis of costs and margins along whole product chains provides valuable quantitative evidence about key chain dimensions, which can then be used to guide public policy and other interventions (Li, 2007; M4P, 2008). Farm gross margin data was collected during the fieldwork to gain insights into the structure of production costs and labor use patterns. The study also collected marketing cost and price data along the tomato chain. The data provide some understanding of marketing costs and used to assess net margins.

## **RESULTS AND DISCUSSIONS**

### **1. Production System**

Tomato cultivation in Great Malang (Malang and Batu) is part of a highly diversified vegetable production system. Since then, Malang farmers have taken advantage of favorable conditions for diversification into high-value vegetable crops. Malang has many mid- and high-altitude villages where vegetables can be grown throughout the year because of their relatively cool climate and good access to water. These locations also benefit from good physical access to markets. They are located less than two hours away from greater

Surabaya, the second largest conurbation in Indonesia, with over 5 million inhabitants. Malang City itself, the second largest in East Java, with a population of more than 800,000, and Malang district, with a population of nearly 2.5 million, are also important markets.

In Malang, tomato ranks third amongst all vegetables in terms of cultivated area, after chilli and cabbage. According to data provided by Dinas Pertanian, between 1,200 and 1,300 hectares of tomatoes are harvested per annum. This represents nearly 30% of the tomato area in the province (see Table 1). Kediri and Banyuwangi are two other important tomato producing districts in East Java, but they only supply the market during a short three-month harvesting season, between July and October.

In Malang tomatoes are grown all year round, with a peak-harvest period extending from May to October. The district produces medium-sized vegetable tomatoes. Cultivation of large and juicy fruit tomato and small cherry tomato is confined to higher-altitude areas in neighbouring Batu, but the production is fairly small as consumer demand for those two categories is very limited. Indonesians eat mainly vegetable tomatoes, often in cooked sauces. Fruit and cherry tomatoes can be found in modern retail outlets in large cities, but in very small volumes, as confirmed during the visits to supermarket stores in Surabaya, where just a few small boxes were in display.

Over half of the tomato area in Malang is located in just two sub-districts: Poncokosumo and Pujon (Table 1). In some years Wajak may account for around 10% of the tomato area in Malang. The crop also grows in several other sub-districts, but these have much smaller production areas than

Poncokosumo or Pujon. Hence, any interventions in the Malang tomato sub-sector should initially target these two sub-districts.

**Table 1.** Tomato harvested area in Malang (2011-12)

Sub-districts	Harvested area (ha)		Share (%)	
	2011	2012	2011	2012
Poncokosumo	463	423	35	35
Pujon	231	221	18	18
Wajak	116	74	9	6
Karangploso	44	69	3	6
Other sub-districts	453	432	35	35
Total	1,307	1,219	100	100

*Source: Unpublished data, Dinas Pertanian Malang*

In any given season, most tomato farmers in Poncokosumo and Pujon allocate between 0.1 and 0.3 hectares to the crop. Tomato farms in other sub-districts tend to be smaller. Therefore, one can conservatively assume that about 2,000 farm households in Poncokosumo and Pujon and more than 3,000 farm households in other parts of Malang are involved in tomato cultivation.

Many different hybrid tomato varieties are grown in Malang. Betavila (East West) and Savero (Syngenta) are popular in many mid-altitude areas. Different villages tend to specialise in different varieties. Some are well adapted to lowland environments, some to mid-altitude settings, and some to high-altitude locations. Some are more tolerant of rain and resistant to certain pests and diseases, therefore being suited to wet-season conditions, while others deliver higher

yields during the dry season. Finally, when choosing varieties, farmers may take fruit colour and size into consideration. The market has a clear preference for vegetable tomatoes with a bright red colour and that are neither too small nor too big.

## 2. Production Costs

On average, the four sampled

farmers invested IDR 39 million (over US\$ 4,000) per hectare (see Table 2). Seed and seedlings represented 7% of farm production costs, plant establishment materials 21%, fertiliser 22%, fungicides and insecticides 17% and hired labour 26%. It should be noted, however, that production costs varied significantly across the sample.

**Table 2.** Average farm production costs (000 IDR/ha)

	Farmer 1	Farmer 2	Farmer 3	Farmer 4	Average	Share (%)
Seed	2,333	560	2,400	1,800	1,946	5
Seedlings	1,200	2,056	720	960	860	2
Plant establishment materials	12,000	2,056	9,660	8,528	8,061	21
Fertilizer	5,783	3,750	14,530	10,630	8,673	22
Other chemicals	5,273	2,876	9,700	9,550	6,850	17
Hired labour	7,107	3,220	15,048	15,757	10,283	26
Other costs	653	3,580	3,950	2,783	2,742	7
Total	34,349	17,292	56,008	50,008	39,415	100

*Source: Fieldwork data (November 2012)*

Two of the farmers used plastic mulch, applied much larger amounts of fertiliser and pesticides, and hired more labour than the other two farmers. The farm households surveyed in our small sample had an average wage outlay of about IDR 10 million per hectare, i.e. over US\$ 1,000. If this figure is extrapolated to the whole district, an estimated US\$ 1.3 million in farm wage

income is generated per year.

## 3. Market channels

A significant share of the tomato harvest in Malang is consumed near production areas, i.e. within the district, in Malang City, and in other parts of East Java, particularly in and around Surabaya. Bali,

greater Jakarta, Lampung and Kalimantan are other important market destinations. Malang tomatoes are distributed and retailed through traditional channels. Only a very small share of local production is channelled to modern retail outlets. These outlets have a very marginal presence in the domestic tomato trade. According to unpublished data collected from a representative sample of consumers in Surabaya, Solo and Bogor, only 2% of households in these three cities rely on hypermarkets and supermarkets as the main outlets for their tomato purchases (Wendy Umberger, pers. comm.). The actual market share of the modern retail segment is much smaller because a significant share of the Indonesian population lives in villages and small and medium-sized towns with no access to supermarket stores.

When buying their daily vegetables, Indonesian consumers show a strong preference for traditional markets, despite the fact that these are often over-crowded and unhygienic. Street vendors are another important source of vegetables. As observed during the fieldwork, vegetable tomatoes retailed in traditional markets often have a similar or better appearance than those displayed in supermarkets or hypermarkets. More importantly from a consumer perspective, tomatoes sold through traditional channels are considerably cheaper. Many consumers also seem to enjoy the experience and the convenience of buying tomatoes and other vegetables from traditional retailers.

None of the traders interviewed in East Java were selling to the food industry. Food processing companies in Indonesia rely on imported tomato paste or puree. A vegetable co-operative in Batu reported that a Japanese firm with offices in Papua, Makassar

and Maluku, is assessing the feasibility of developing local production of organic tomato puree for the Japanese market. Surabaya was chosen as the potential location for a new factory. The company was conducting product trials to determine the nutritional value and other quality parameters of locally grown organic tomatoes.

Traditional tomato chains (intra-district, intra-provincial, inter-provincial and inter-island) are discussed in the next four sub-sections. Despite strong growth in the modern retail sector, supermarkets still have a very residual share of the retail market and this is unlikely to change in the foreseeable future. Currently, modern stores procure tomatoes and other vegetables from wholesale markets and dedicated suppliers. The latter buy their supplies from a small number of farmers or market wholesalers, in a system that is not so different from the traditional trade (APO, 1997). Supermarket suppliers have been able to infiltrate the modern retail segment due to their ability to meet the contractual conditions imposed by supermarkets (i.e. late payments and high penalties for failing to deliver agreed volumes), not necessarily because they have developed a supply of high quality vegetables. Some key informants also reported that, in many cases, personal relationships with supermarket procurement managers and the payment of informal fees are necessary conditions for entry into the modern retail channel.

#### 4. Intra-district chains

The intra-district chain is depicted in Figure 1. Malang City represents an important market for local tomato growers. Gadang market is the main wholesale distribution

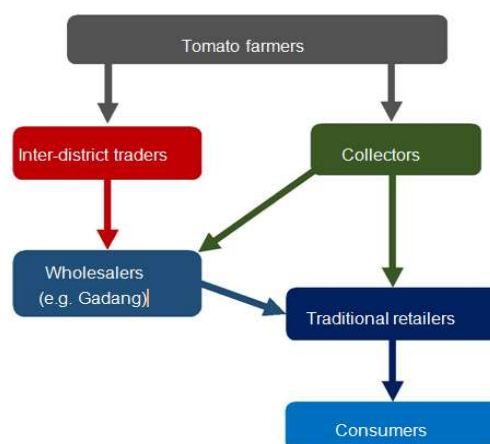
centre, supplying large numbers of urban retailers. There are some 30 wholesalers in Gadang that sell tomatoes (and other vegetables). About half specialise in sales to retailers, handling between 1 and 3 tonnes of tomato per day. The other half specialise in long-distance trade, supplying wholesalers in Bali, greater Jakarta and Lampung. Gadang traders get their supplies from collectors and inter-district traders.

Village assembly markets, of which Karangploso is perhaps the largest, supply peri-urban and rural retailers. Many collectors bring their supplies to these markets. Inter-district traders may occasionally sell at these markets, but they primarily target markets outside the district.

Prompt payment is the norm in intra-district chains. Village traders pay farmers upon collection of the crop or within a day. These traders often employ their own “workers” to collect (and grade) the crop on farm. Likewise, wholesalers pay their suppliers upon delivery of a consignment or within days. Wholesalers only accept delayed payment from select regular customers. Wholesalers in Malang City do not provide cash advances to their suppliers. The only significant credit flows along intra-district chains are between village traders and farmers.

Inter-district traders are a much more important source of credit than collectors because they handle larger volumes and deal with a larger number of growers. Both collectors and inter-district traders sell a variety of vegetables, but for many of them tomato is a key crop in their portfolio, especially in Poncokusumo and Pujon. In these two sub-districts, inter-district traders normally sell between 1 and 3 tonnes

of tomato per day and have 40 to 80 regular suppliers. Collectors tend to handle less than 1.5 tonnes per day. They will normally purchase vegetables from 20 to 40 growers.



**Figure 1. Intra-district chain**

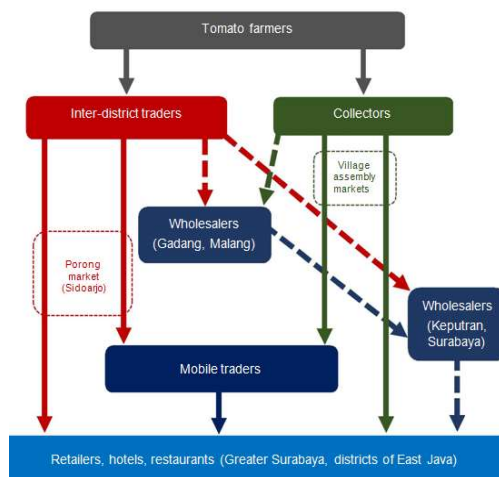
## 5. Intra-provincial chains

Figure 2. Porong market in Sidoarjo is a major distribution centre for Malang tomatoes. Many inter-district traders go to Porong every day to sell a variety of vegetables. They have been participating in this trade for many years. The produce is transported in pick-up trucks owned by the traders themselves. Each has several regular buyers in Porong. These are “large” market retailers from Sidoarjo, Surabaya, Gresik, Mojokerto, Pasuruan and Madura, or mobile traders who supply market and street vendors in these locations. Some of the retailers buying directly from Porong also supply market and street vendors. Interestingly, some market retailers in and around Surabaya buy their supplies collectively from Porong market. The fact that inter-district traders have been doing



business with buyers in Porong for many years is important for efficient coordination and negotiation of transactions. Prices are determined when the parties meet at the market.

Some Gadang wholesalers and some inter-district traders also supply Keputran, the main wholesale market for fresh produce in Surabaya, but this is a secondary channel. Inter-district traders prefer to send most of their supplies to Porong because this market is closer to Malang and handles larger volumes than Keputran. Moreover, buyers in Porong purchase a range of vegetables and pay on the spot, whereas those in Keputran specialize in specific vegetable crops and pay within a few days of delivery. Supplies to neighboring Blitar and Lumajang districts are channelled through village assembly markets. Many mobile traders from these districts source their daily supplies from village markets in Malang. Local collectors are their main suppliers.



**Figure 2. Intra-provincial chain**

The pathway and participants in inter-provincial chains are depicted in Figure 3. A few traders in Malang supply wholesalers in

and around Jakarta. This trade takes place throughout the year, peaking around Ramadan and in late December, before the New Year. Despite the distance, some wholesalers in Jakarta and surrounding cities source tomatoes from Malang because the district can provide a continuous supply.

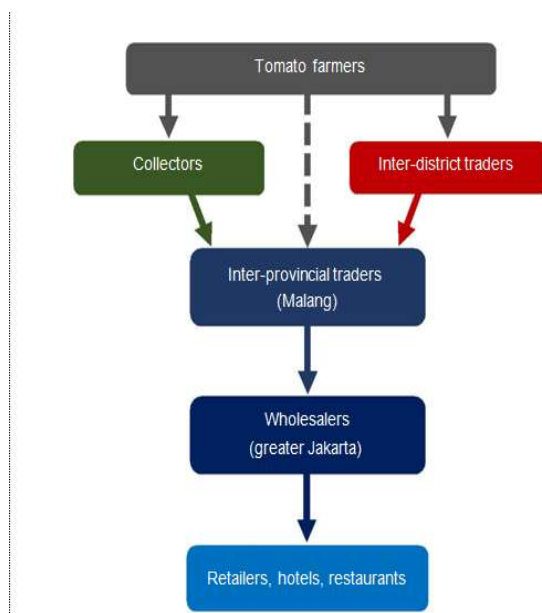
## 6. Inter-provincial chains

Gadang market is the main assembly point for tomatoes sent to greater Jakarta. Approximately ten wholesalers in Gadang specialise in the Jakarta trade. Some also supply buyers in Lampung, in southern Sumatra. The study team interviewed one such trader. He sells approximately 3 tonnes of tomato per day to one wholesaler in Tanah Tinggi market in Tangerang and a similar quantity to one customer in Lampung. He buys tomatoes from seven village traders in the Wajak sub-district.

At least one village trader, supplies greater Jakarta directly. She is the largest vegetable trader in Poncosumo. Trader has been doing business with one wholesaler in Tangerang since 1996. Chilli is the main vegetable in her portfolio, but she does send 30 to 40 boxes of tomato (1.8 to 2.5 tonnes) daily to her client in Tanah Tinggi market. Traders work closely with 150 local growers, but she also buys from other districts in East Java.

Inter-provincial traders handle larger volumes of fewer vegetables than inter-district traders. They normally supply one or two buyers in one or two markets. Inter-provincial traders face difficulties in dealing with many wholesale customers because each needs a continuous supply of relatively large consignments and because high levels of trust are required for long-distance transactions.

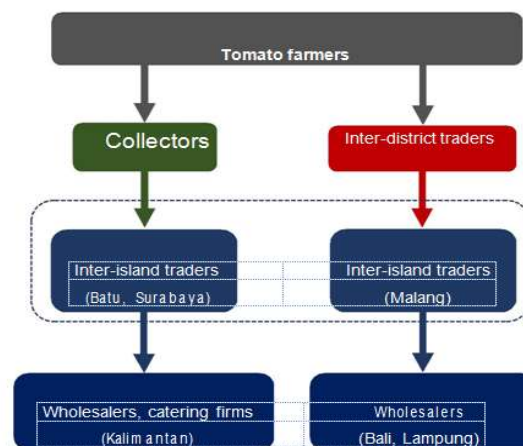
Transactions are coordinated over the phone, so the parties do not meet face to face. Prices are determined before a consignment is sent from Malang, but the payment will normally be settled five to seven days after the produce arrives at its destination. Inter-provincial traders do not receive advances from buyers, having to rely on their own funds and bank loans for working capital.



**Figure 3. Inter-provincial chain**

#### 7. Inter-island chains

Product flows fluctuate significantly throughout the year, depending on the price differences between Malang and Kalimantan. There is also a regular trade in tomatoes from Malang to Bali and Lampung, in southern Sumatra. Inter-island flows from Malang usually peak around Ramadan and the New Year. Some traders reported higher trading volumes during the dry seson.



**Figure 4. Kalimantan chain**

Supplies to Kalimantan are coordinated by inter-island traders in Batu and Surabaya. The study team interviewed three of these traders in Batu, but unfortunately there was no opportunity to meet inter-island traders in Surabaya. More than 10 traders in Batu focus on the Kalimantan market. Some are large operations servicing the East Java-Kalimantan trade in fruits and vegetables, construction materials, and other goods. Individual tomato consignments will typically range from 1 to 8 tonnes, depending on the trader and the time of supply. The larger traders source their tomatoes from different districts, but most of their supplies come from village traders in Malang and Batu. Some Batu traders supply just one or two clients in one or two markets, others are linked to several markets and may have five or more regular buyers in each location. Their clients consist of traditional wholesalers in Banjarmasin, Balikpapan, Samarinda, Sampit, Palangkaraya, Kumai, and other urban centres. One of the traders interviewed also supplies one catering



company that services large mining concerns.

While business relations with catering firms are governed by written contracts with fixed price arrangements, transactions with large primary wholesalers are based on verbal agreements and variable prices, determined on the basis of spot market conditions in Kalimantan. The price for each consignment is agreed upon when an order is placed. Any product losses and discounts for poor quality have to be borne by the inter-island trader. During the rainy season, Batu traders work with high gross margins in order to protect themselves against high post-harvest losses.

Most supplies to Bali are managed by four or five traders in Gadang market. The study team met one of these traders. He sends daily consignments to ten regular clients in Baturiti wholesale market. Sometimes the consignment will comprise a six-tonne truck fully loaded with tomatoes. Other times it will consist of three or four tonnes of tomatoes, with the balance of the load comprising other vegetables, particularly broccoli. Occasionally, when prices in Malang are very high, he will procure tomatoes from his customers in Bali.

Gadang is also the main assembly point for tomatoes sent to Lampung. These transactions are conducted by some of the inter-provincial traders that have links to buyers in and around Jakarta. The Jakarta and Lampung chains are very similar in their structure and governance.

#### 8. Quality Management Systems

Tomato from Malang has a good reputation in East Java. According to the

traders interviewed in Porong market, Malang tomatoes have better colour, size and taste than competing produce from Bandung, in West Java, but a shorter shelf life. The tomato harvest is carried out by farmers but coordinated and supervised by village traders. The crop is usually collected, sorted and packed on the farm. Traders are therefore able to ensure that product standards, particularly fruit maturity and size, meet the requirements of their buyers.

Tomatoes are graded on the farm, according to size. Grade A tomatoes weigh around 80 grams (12 fruit per kilogram), grade B about 70 grams (14 fruit per kilogram), and graded C between 60 and 65 grams (16 fruit per kilogram). Farmers are often paying higher prices for higher grades. Clean tomatoes with no defects will also fetch a higher price than the fruit of inferior appearance. Some examples of price differentiation across grades were provided by traders based on recent prices. These examples are presented in Table 3 for illustrative purposes.

Tomatoes are transported in wooden boxes of 60 to 65 kilogram capacity, irrespective of their destination. These boxes are then stacked on top of each other in small or large trucks. While such practises may be acceptable for tomatoes transported in small vehicles to nearby markets, they are clearly inadequate for produce that is shipped to Kalimantan in large trucks and under high temperatures and humidity. Current packaging practices are certainly one important factor contributing to very high product losses along this chain.

**Table 3.** Purchasing prices for different

tomato grades (IDR/kg)

	Grade A	Grade B	Grade C
Inter-district trader, Poncokosumo	1,000	700	500
Inter-district trader, Wajak	1,000 - 2,000	700 - 1,500	500 - 1,000
Inter-provincial trader (Gadang)	800	4-500	350
Inter-island trader (Gadang)	1,200 - 1,500	500 - 700	350

Source: Fieldwork data

Inter-district traders reported negligible physical and quality losses, as they supply markets that are less than two or three hours from the production areas. The tomatoes are normally sold within a few hours after arriving in Porong. Wholesalers in Keputran market experience losses of 5% or less during the dry season, but these may rise to 10% or more during the rainy season. Such losses include produce that needs to be discounted due to bruising and other defects. Retailers reported similar level of losses.

According to traders in Gadang, physical losses during transportation to Bali and markets in or around Jakarta are negligible. It takes up to 12 hours for the tomatoes to reach Bali and 18 hours for the produce to arrive in Jakarta. However, it is common for 5-10% of a consignment to be sold at a discounted price because of quality losses between the farm and the destination markets in Bali or greater Jakarta.

Contrary to Malang traders, inter-island traders in Batu face very high quality

losses during the rainy season, despite the fact that they buy immature fruit and varieties with lower water content. One trader reported that between 40% and 60% of the tomatoes traded during the wet season have to be discounted by up to 25%. A second trader estimated that half of his supplies during that period are sold at a reduced price, which can be as low as 50% of the normal price. A third reported price deductions for 40% to 50% of his rainy-season consignments. These losses could be reduced if traders were to adopt improved packaging practices.

## 9. Margins

Tomato growers received approximately 70% of the retail price. Inter-district traders, distributors, and retailers "appropriated" 12% of the crop's retail value as net margin. Marketing costs accounted for 19% of the retail price. Retailers earned a relatively low margin due to product losses and high transportation costs per kilogram, representing 40% and 20%, respectively, of total marketing costs from the farm through to retailing. The net margin for inter-district traders was also small when measured as a percentage of the price received in Porong, but less so in absolute terms because of high market prices. As highlighted by many key informants, inter-district traders earn very small profits on average, and may even incur financial losses when the market is over-supplied and the price of tomatoes very low. In such cases, the trader will keep a share of the farmer's supply, say five kilograms for every 60-65 kilograms, or charge a fixed amount, say IDR 600 or 700 per kilogram sold.

**Table 4.** Gross and net marketing margins along the Malang-Porong chain

	Farmer	Inter-district trader	Large retailer	Small retailer
	Malang	Malang	Sidoarjo	Sidoarjo
Selling price (IDR/kg)	9,000	9,750	10,500	13,000
Share of retail price (%)	69	75	81	100
Gross margin (IDR/kg)*		750	750	2,500
Gross margin (%)		7.8	7.1	19.2
Variable costs (IDR/kg)		410	273	1,811
Labour		32	16	0
Packaging		108	110	37
Transportation		164	38	500
Product losses		0	98	1,050
Other		106	11	224
Net margin (IDR/kg)*		340	477	689
Net margin (%)		3.5	4.5	5.3

Source: Fieldwork data, 16-17 July 2013

Gross margin per kg = selling price – purchasing price

\*\*Net margin per kg = selling price – purchasing price – other variable costs per kg

## CONCLUSIONS AND RECOMMENDATION

Pests and diseases are a strategic issues and improved pest and disease management systems on the income of vegetable farmers, the environment, and human health cannot be overemphasized. Post-harvest losses along tomato and other vegetable chains are another critical issue due to their potential negative impacts on farm-gate and consumer prices. The issues focus on the inter-island trade, as physical and quality losses along these chains are often very high. Reducing these losses would establish new opportunities for inter-island trade, benefiting both producers and consumers. This study identified post-harvest losses during transportation from East Java to

Kalimantan as a major issue and improved packaging technology as one possible solution. However, further research is needed to quantify losses along the whole chain, determine the causes of fruit breakdown, and assess the technical and financial feasibility of different innovations with chain actors.

The development of a local tomato processing industry would reduce short-term price instability and create some employment opportunities, especially for women, but research is needed to support private sector investments. The development of cold storage would also have a stabilizing effect on prices and create favorable conditions for the development of long-distance trade and exports. Storing tomato and other vegetables under cool conditions is technically complex.

Effects on the quality and market acceptability for different crops and varieties need to be determined before the financial feasibility of different storage models can be assessed.

## ACKNOWLEDGMENT

The Author would like to thank to the tomato value chain team for Eastern Indonesia Agribusiness Development Opportunities (EI-ADO) Project. The paper is part of the final report of the tomato value chains study, which managed by Collins Higgins Consulting Group for the Australian Centre for International Agricultural Research for ACIAR Project AGB-2012-009.

## REFERENCES

- APO (Asian Productivity Organization). 1997. Marketing systems for agricultural products. Seminar report p. 216-220.
- Armenia, P. T., Menz, K. M., Rogers, S. G., Gonzaga, Z. C., Gerona, R. G. and E.R. Tausa. 2013. Economics of vegetable production under protected cropping structures in the Eastern Visayas, Philippines, in *J. Oakeshott and D. Hall (eds) Smallholder HOPES – horticulture, people and soil*, Proceedings of the ACIAR-PCAARRD Southern Philippines Fruit and Vegetables Program meeting, 3 July, 2012, Cebu Philipinnes. ACIAR Proceedings 139, pp. 111-122, Australian Center for International Agricultural Research: Canberra. <<http://aciarc.gov.au/files/pr139.pdf>>.
- Darmawan, D. A., and Pasandaran, E. (2000). Indonesia. In M. Ali (Ed.), *Dynamics of vegetable production, distribution, and consumption in Asia*.
- Database Statistik Pertanian. 2004. Departemen Pertanian Republik Indonesia, Pusat Data dan Informasi Pertanian, Statistik Pertanian database, dikases melalui website <http://database.deptan.go.id/bdspweb/bdsp-v2.asp>
- Dinas Pertanian Propinsi Jawa Timur. 2009. *Produksi Sayuran di Jawa Timur Periode 2004- 2007*.
- Gonzaga, Z. C., Capuno, O. B., Loreto, M. B., Gerona, R. G., Borines, L. M., Tulin, A. T., Mangmang, J. S., Lusanta, D. C., Dimabuyu, H. B. and S. G. and Rogers. 2013. Low-cost protected cultivation: enhancing year-round production of high-value vegetables in the Philippines, in *J. Oakeshott and D. Hall (eds) Smallholder HOPES*
- Johnson, G. I., Weinberger, K., & Wu, M.-h. (2008). *The vegetable industry in tropical Asia: Indonesia: AVRDC – The World Vegetable Center*. Document Number)
- Li, L. (2007). *Supply chain management: concepts, techniques and practices enhancing the value through collaboration*. Singapore: World Scientific.
- M4P. 2008. *Making Value Chains Work Better for the Poor: A Toolbook for Practitioners of Value Chain Analysis*, Version 3, Making Markets Work Better for the Poor (M4P) Project, UK Department of International Development (DFID), Agricultural Development International: Phnom Penh.
- Menegay, M. R. and W. A. Darmono. 2007. *A Rapid Assessment of the Horticulture Vegetable Sector in Indonesia*. AMARTA, USAID: Jakarta.



Sekretariat Dirjen (Sekdirjen) Hortikultura.  
2010. Produksi Tanaman Sayuran di  
Indonesia Periode 2007- 2009.