



Australian Government

**Australian Centre for
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Eastern Indonesia-Agribusiness Development Opportunities (EI-ADO)

Tomato Value Chain Study Executive Summary



Locations: East Java, West Nusa Tenggara (NTB), and East Nusa Tenggara (NTT)

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Executive summary – tomato

This project is one of five lead commodity value chain studies undertaken as part of the larger \$1 million Australian Government's Department of Foreign Affairs and Trade (DFAT) funded project Eastern Indonesia Agribusiness Development Opportunities (EI-ADO). In this project, Australian Centre for International Agricultural Research (ACIAR) commissioned research to identify lead commodity value chains to be the focus of a new DFAT program Australia Indonesia Partnership for Decentralisation – Rural Economic Program (AIPD-Rural).

This study was conducted to inform pro-poor interventions in vegetable value chains under DFAT AIPD-Rural program. It covers a wide range of issues deemed important for a general understanding of the tomato sub-sector in Indonesia, the tomato value chain in Malang district, its position in the wider market landscape, and its potential as a vehicle for improved rural livelihoods. Possible entry points for pro-poor chain innovations are proposed and discussed.

Indonesia's position in global production and trade

Southeast Asia and East Asia have a very marginal position in the global tomato industry. Indonesia is no exception. The country accounts for less than 1% of world production and an even smaller share of global export and import flows.

Spatial patterns and trends

Tomato is the fifth most important vegetable crop in Indonesia in terms of cultivated area. Between 50,000 and 60,000 hectares are harvested every year. West Java accounts for about one-third of domestic production. North Sumatra is the second largest producer, with about 10% of the national harvest. East Java ranks fourth, after Central Java, with about 6%.

Tomato production increased by 50% between 2007 and 2011. Productivity gains accounted for most of this growth. West Java and Bali have by far the most productive tomato farms. Average farm yields in East Java and East Nusa Tenggara (NTT) are considerably lower than the national average. While yields have been rising over time, there is still a large productivity gap between Indonesia and major tomato producing countries.

International trade

Indonesia is self-sufficient in tomatoes. There are some exports from northern Sumatra, but the volumes are very small. Singapore and Malaysia are the main markets. While there may be scope for increasing sales to these and other regional markets, the tomato sub-sector is not yet sufficiently organised to take advantage of such opportunities. Excess levels of pesticide residues and a lack of cold chains constitute major market access barriers.

Price patterns

Tomato prices fluctuate significantly within the year and within seasons. While there is always a peak harvest around August and September, supply and prices during other months of the year are much less predictable. Farmers appear to be over-reacting to prices, thereby exacerbating market volatility: when prices are low, they tend to reduce areas, leading to high prices at harvest time, and vice-versa.

Tomato production in Malang

In Malang, tomatoes are grown all year round as part of a highly diversified vegetable production system, with a peak-harvest period from May to October. The crop ranks third amongst all vegetables in terms of cultivated area, after chilli and cabbage. Between 1,200 and 1,300 hectares, (i.e. nearly one-third of the tomato area in the province), are harvested every year. Over half of the tomato area is located in Poncokosumo and Pujon. It is estimated that about 2,000 farm households in these two sub-districts and more than 3,000 in other parts of the district are involved in tomato cultivation.

Tomato farms in Poncokosumo and Pujon typically range from 0.1 and 0.3 hectares. They tend to be smaller in other sub-districts. Small farm size reflects a context where farm households have limited landholdings and grow three to five different vegetable crops, sometimes more, at any given point in time. Having a diversified vegetable crop portfolio reduces exposure to production and marketing risks.

Many different hybrid tomato varieties are grown in Malang. Altitude and season are two major determinants of varietal choices. In addition, some farmers prefer shorter harvesting seasons, whereas others opt to grow varieties that can be harvested over longer periods. When choosing varieties, farmers may also take fruit colour and size into consideration. The market has a clear preference for vegetable tomatoes that are neither too small nor too big and have a bright red colour.

Tomato farming is an expensive venture. Key informants reported average investment levels around US\$ 2,000-2,500 per hectare. One of the farmers surveyed spent nearly US\$ 6,000 on a hectare basis. Hired labour, fertiliser, and plant establishment materials are the main cost items, followed by fungicides and pesticides.

Tomato farms generate significant wage employment. Farm households in our small sample had an average wage outlay of more than US\$ 1,000 per hectare. Wage labour accounted for 80% of total farm employment and women for 60% of total wage employment. Female workers received lower wages than men.

The tomato input chain in Malang

Farmers purchase seed and agro-chemicals from local input shops. Prompt payment is the norm. In addition, many growers receive seed and agro-chemicals on credit from village traders. These also provide cash loans. Credit functions as an implicit verbal contract whereby the farmer agrees to sell the harvest to the trader.

In villages where tomato is a major crop, 40% - 70% of growers purchase seedlings from local nurseries. These nurseries also produce chilli and cabbage seedlings. They operate during the whole year. Most produce between 20,000 and 100,000 seedlings per month, but a few have a monthly output of 200,000 to 400,000 seedlings. These are large by Malang standards, but small in comparison to some nurseries in Pare, Kediri.

Spatial product flows and market channels

A significant share of the tomato harvest in Malang is consumed within the district, in Malang City, and in other parts of East Java. Bali, greater Jakarta, Lampung and Kalimantan are

other market destinations. Nearly all the production is distributed and retailed through traditional channels.

Intra-district chains

Gadang market is the main wholesale distribution centre in Malang. Wholesalers in this market get their supplies from village traders. Collectors also channel produce to village assembly markets, a very important source of supplies for peri-urban and rural retailers. Prompt payment is the norm in intra-district chains.

Intra-provincial chains

Porong market in Sidoarjo is a major distribution centre for Malang tomatoes. Inter-district traders go to this market every day to sell a variety of vegetables. Each has 10 or more regular buyers. Most are “large” market retailers from Sidoarjo, Surabaya, Gresik, Mojokerto, Pasuruan and Madura, or mobile traders supplying market and street vendors in these locations.

Some Gadang traders and some inter-district traders also supply wholesalers in Keputran market, in Surabaya, but this is a secondary channel. Inter-district traders prefer to send their supplies to Porong because this market is closer to Malang and handles larger volumes. Moreover, buyers in Porong purchase a range of vegetables and pay on the spot, whereas those in Keputran specialise on specific crops and pay a few days after delivery. In both cases, prices are determined when the parties meet at the market.

Supplies to neighbouring Blitar and Lumajang districts are channelled through village assembly markets in Malang. Many mobile traders from those districts source their daily supplies from these markets. Local collectors are their main suppliers.

Inter-provincial chains

A few traders in Malang channel tomatoes to wholesalers in and around Jakarta. This trade takes place throughout the year, peaking around Ramadan and in late December. Gadang market is the main assembly point for tomatoes sent to greater Jakarta. About ten wholesalers specialise in this trade.

Inter-provincial traders handle larger volumes of fewer vegetables than inter-district traders. They normally supply one or two markets where they have one or two buyers with whom they have been doing business for a long time. Transactions are coordinated over the phone. Prices are determined before a consignment is sent from Malang. The payment will be settled five or seven days after this has arrived at its destination. Inter-provincial traders receive no advances from buyers. They rely on their own funds and bank loans for working capital.

Inter-island chains

Kalimantan is the main market outside East Java. There is also a regular trade in tomatoes from Malang to Bali and Lampung, in southern Sumatra. Inter-island product flows usually peak around Ramadan and the New Year. Some inter-island traders reported higher trading volumes during the dry season.

Supplies to Kalimantan are coordinated by traders in Batu and Surabaya. There are at least 10 inter-island traders in Batu. Most supplies to Bali are managed by four or five traders in Gadang market. Gadang is also the main assembly point for tomatoes sent to Lampung. Transactions with Lampung buyers are conducted by some of the inter-provincial traders linked to markets in and around Jakarta.

Batu traders focus exclusively on the Kalimantan market, sell a range of fresh produce, and source most of their supplies from village traders. Some sell to just one or two clients in one or two markets, others have several regular buyers in three or four market locations. Their clients consist of traditional wholesalers from Banjarmasin, 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 traditional wholesalers are based on verbal agreements and variable prices. Prices are agreed when an order is placed.

Transactions with buyers in Kalimantan are underpinned by high levels of trust. This is essential in a context where inter-island traders supply fairly large fruit and vegetable consignments, face variable post-harvest losses during transportation, and are paid several weeks after a consignment has been delivered. Inter-island traders are very reluctant to do business with new buyers in Kalimantan for fear that they may default on their payments.

Contract farming and collective action

No formal contract farming schemes were found in the Malang tomato chain. Such schemes are costly to develop and difficult to justify in a context where premium markets are so under-developed. Likewise, the current market landscape does not favour the emergence of farmer groups or cooperatives. At the moment, the demand for premium quality produce is too small to justify the costs and risks associated with collective action.

Information and knowledge flows

Malang offers a favourable context for the exchange of production and market information due to a large presence of commercial growers, traders, input retailers, and nurseries. In addition, all the main seed and agro-chemical companies have staff stationed in the district.

Despite this favourable context, there are some critical knowledge gaps. Knowledge on pest control is clearly inadequate. Location-specific research is needed to determine possible improvements over current practices. Furthermore, both farmers and traders have difficulties forming reasonable expectations about future price scenarios, an essential consideration for any planting decisions.

Quality management systems

Tomatoes from Malang have a good reputation in East Java. The crop is harvested by farmers, often under the coordination and supervision of village traders. Tomatoes are sorted and graded on farm according to size. Farmers often receive higher prices for higher grades.

Tomatoes for the Java, Bali and Lampung markets are harvested at the mature green to breaker stage. The tomatoes will develop a full red ripe colour two or three days after

harvest. Produce sent to Kalimantan is picked green so that it can better endure transportation and handling stresses.

Tomatoes are transported in large wooden boxes. These are then stacked on top of each other in small or large trucks. While such practices may be acceptable for tomatoes sold in nearby markets, they are clearly inadequate for produce that is shipped to Kalimantan. Current packaging practices are one important factor contributing to very high product losses along this chain. During the rainy season, Batu traders have to sell up to 60% of a consignment at discount prices because of quality losses during transportation to Kalimantan.

Margins

Net margins are known to fluctuate considerably between transactions because of short-term price volatility. Inter-district traders only know their selling price after they have purchased the crop from farmers and may incur some financial losses, or just break even, at times when the market is over-supplied and the price of tomatoes very low. In order to protect themselves against adverse price fluctuations, some inter-district traders have developed commission-based arrangements with farmers.

Inter-island traders in Batu operate with fairly high gross margins during the rainy season in order to protect themselves against post-harvest quality losses. These losses therefore have a clear negative impact on farm-gate prices.

Problems and constraints

Diseases, particularly bacterial wilt, fusarium, and anthracnose, and price volatility are the two issues farmers are most concerned with. Diseases can have a very negative impact on yields, especially during the rainy season, while the possibility that prices will be very low at harvest time is a major source of risk.

Short-term price volatility is the main problem faced by inter-district traders. They are particularly concerned with unpredictable fluctuations during periods of very low prices. During these periods, traders may incur losses on individual consignments.

Traders supplying Kalimantan highlighted two main problems: excessive quality losses during the rainy season and very late payment by clients. These traders are also concerned with the risk of default by Kalimantan buyers, a situation that will result in financial losses and the breakdown in the business relationship.

Opportunities for pro-poor intervention

Impacts from interventions in the tomato chain could be increased significantly if Batu, Kediri, Banyuwangi and East Lombok districts were targeted alongside Malang. From an impact perspective, there is also a strong rationale for pursuing an upgrading of the whole vegetable sub-sector in target districts rather than a more narrow strategy focused exclusively on the tomato chain. Some of the proposed tomato chain interventions could be designed to include other vegetable crops.

Four possible areas for intervention were identified: grafted seedlings for control of bacterial wilt; improved packaging technologies for a reduction in post-harvest losses along the

Kalimantan chain; development of market outlook assessment capacities for improved planting decisions; and protected cropping for increased farm profits.

While interventions aimed at supporting private sector investment in cold storage and improvements in fertilisation practices, water management, and pesticide use are also discussed, these are not included in the portfolio of recommended interventions because of limited scope for impacts at scale over the medium term.

1. Development of a local market for grafted tomato seedlings

Commercial grafted seedling production has been developed successfully in Vietnam, with significant positive impacts on tomato farm yields and incomes. There is an opportunity to replicate this process in East Java, with technical assistance from the World Vegetable Center. A series of participatory demo-trials will need to be implemented to test the technology, transfer critical technical know-how to local nurseries, and create the necessary demand from farmers. Larger nurseries will need to be actively involved as partners. Different models for production of eggplant rootstock, and opportunities for involving seed companies, will need to be assessed. While Malang is an obvious location for intervention, AIPD-Rural should also consider targeting Kediri district.

2. Improving packaging technologies and practices along the Kalimantan chain

Inter-island traders reported very high post-harvest losses during transportation to Kalimantan. These losses have a negative impact on farm-gate prices. Poor packaging practices are one contributing factor. AIPD-Rural should consider working with a selected number of inter-island traders in Batu and Surabaya and one or two packaging material firms to develop improved packaging solutions. The role of the project would be to link the two parties for joint development of appropriate solutions, fund product development costs, and subsidise the commercial piloting of new packaging prototypes. Opportunities for replicating the process for other vegetable crops should be pursued.

3. Anticipating future market scenarios for improved planting decisions

Tomato farmers appear to be at a loss when trying to make sense of market outlook scenarios. They tend to expand cultivation when prices are high, thereby creating a glut in the market three or four months later, and to reduce planted areas when prices are low, therefore failing to take advantage of product scarcities at harvest time. In order to support better planting decisions by farmers, AIPD-Rural could fund a training programme aimed at improving market outlook assessment capacities. Since Malang growers and traders have a diversified vegetable portfolio, it makes sense to focus on different crops, not just tomato. In order to increase outreach, the intervention could be extended to neighbouring Batu district. An appropriate provider of training services would need to be identified. Trainers would work with lead farmers and traders to identify improved planting strategies and develop links to sources of information that can help local chain actors anticipate future supply scenarios.

4. Development of protected vegetable cropping

Large seed companies such as East West could be targeted for the establishment of trial and demonstration structures in different sites and delivery of technical advisory services to village traders and farmers. This would offer opportunities for expanding seed sales. Strong input from researchers and economists throughout the whole intervention cycle will be

needed for designing low-cost but effective structures, identifying the most profitable crop portfolios, and developing appropriate farm management protocols. It is recommended that Malang and perhaps Batu are initially targeted. If successful, the initiative could be scaled-out to other major vegetable production districts in East Java, as well as East Lombok.

Areas for future research

Several strategic areas for future research were identified during this study, including pests and diseases, post-harvest losses, cold storage, contract farming, processing, and export markets. Research in these areas should not be confined to tomato, but cover other vegetables as well.