Agriproduct Supply-Chain Management in Developing Countries

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Improved Marketing of Mandarins for East Nusa Tenggara in Indonesia

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Abstract

In the highland areas of West Timor, where the climate is relatively cool, the mandarin variety Keprok Soe is widely grown in the districts of Timor Tengah Selatan (TTS) and Timor Tengah Utara (TTU) in Nusa Tenggara Timur (NTT) Province. Largely due to its economic value and popularity among local consumers, the Indonesian Government adopted some measures to promote Keprok Soe. Good grades of Keprok Soe fetch a premium price in direct competition to imported mandarins from various countries including China, Pakistan, Israel and Australia. Basically, there are two supply chains for mandarins grown in West Timor. About 90% of the mandarins are sold locally, with only 10% sold to other provinces. In general, there are three methods by which farmers can sell their mandarins: forward-sale by tree, per tree sale at harvest and per kilo sale after harvest. Farmers' use of different selling methods is often related to the size of their mandarin farm, income, price of mandarins in that year, availability of family labour, farmers' educational experiences, length of farming experience, and distance from the farm to the local market.

Established traders play a key role as channel managers in the supply chain, especially for the inter-island supply chain. Quite exceptionally, traders have motivated farmers to strive for good products, be competitive and become 'champions'. Hence, the traders have been observed to play a mixed role of channel manager, information supplier, co-investor and extension officer. These activities and alliances suggest that a reciprocal rather than a win–lose relationship exists.

Supply-chain constraints include production (cultural production, plant protection), poor infrastructure, and postharvest losses (20%). Potential strategies for chain improvements include horizontal integration at the farmer level, enhancement of the capacity of traders as supply-chain coordinators, and branding of Keprok Soe. In relation to improving the likelihood of implementing these strategies, this Australian Centre for International Agricultural Research (ACIAR) project conducted production and marketing workshops, and broadcast information and knowledge by radio.

In the highland areas of West Timor, where the climate is relatively cool, the mandarin variety Keprok Soe is widely grown in the districts of Timor Tengah Selatan (TTS) and Timor Tengah Utara (TTU) in Nusa Tenggara Timur (NTT) Province. Keprok Soe was first planted in the 1970s, but commercialisation of the product started only in the 1990s. In some of the villages of the two districts,

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Keprok Soe (literally ‘mandarin from Soe’) constitutes the main source of income (70%) for subsistence farmers with farms less than one hectare.

In recent times, the price of Keprok Soe has steadily risen. While part of this price rise has been due to the influx of refugees from East Timor and Ambon and United Nations personnel, another important factor has been the increased appreciation and consumption of the locally grown fruit by local residents since the 1990s.

In contrast to most other domestic mandarins in Indonesia, Keprok Soe has a mixed gold-and-green skin colour, and is easy to peel, juicy and relatively sweet in taste. To encourage farmers in the region to focus on this variety, and perhaps for administrative reasons, the government discourages the planting of other varieties. Keprok Soe has not performed well in trials in other production areas (such as Java), meaning that the variety is exclusive to West Timor. Good grades of Keprok Soe fetch a premium price in direct competition to imported mandarins from various countries, including China, Pakistan, Israel and Australia. Mandarins are in high demand in Indonesia and the supply of Keprok Soe is largely demand-pull. Nevertheless, the presence of imported fruit indicates that the Keprok Soe chain is already competing with import chains to maintain its price premium.

Largely due to its economic value and popularity among local consumers, the Indonesian government adopted some measures to promote Keprok Soe. They included providing free seedlings and discouraging farmers from planting other varieties of mandarins. Some non-governmental organisation (NGO) projects in West Timor have also provided free seedlings and irrigation assistance to expand the current production of Keprok Soe. With a substantial increase in production area, the outturn of Keprok Soe is expected to double in a couple of years. Hence, market competition will increase. Moreover, as Keprok Soe already competes with imported products, the quality of competitors’ products can be expected to improve.

According to a recent survey conducted in five villages in TTS (Tobu, Netpala, Bijeli, Oelbubuk and Fatumnasi), the average age of farmers growing mandarins in TTS was about 46 years (range 26–68 years old). The average experience in growing Keprok Soe was about 18 years (range 5–30 years). The average number of trees owned by each farm household was about 90. The average production was 55 kg per tree, with a maximum of 68 kg per tree. About 68% of the yield of Keprok Soe was sold to make a living, with the rest used for social purposes, such as gifts for friends and relatives, church ceremonies and own consumption. In the villages of Oelbubuk and Netpala, 80% of total mandarin production was used to make a living. The main reason why their crops could make a higher contribution to household income was because these villages are closer to the subdistrict market and transportation is less of an issue compared to other villages (Leki and Wadu 2000).

Methods of Selling Keprok Soe

In general, there are three methods by which farmers can sell their mandarins: forward-sale by tree, per tree sale at harvest and per kilo sale after harvest. For the last method, farmers are generally responsible for taking the fruit to the venue of the trader or to local markets by themselves.

Forward-sale by tree

Sales using this method generally occur 2–3 months before harvest, when farmers are in need of cash. Around January, February or March, when there are mandarins on the trees, farmers go to a local trader in their village and ask the trader to have a look at the mandarins on their trees. After negotiation, and if a deal is made, the trader pays half of the price to the farmer. The balance will be paid at the harvest time. Traders can also pay by goods, such as food, clothes, radios, tape recorders etc. After half-payment by the trader, the crop is then owned by the trader and the farmer is obligated to look after the trees to prevent such things as stealing and attack by pests. Price per tree is generally very low. For example, the price per tree was about IDR40,000/tree in Netpala village. In contrast, when farmers sell mandarins by weight, they can get over IDR200,000/tree at harvest time — five times more than from forward-sale (Leki and Wadu 2000).

This method of sale is practised when farmers are in urgent need of cash for food, medical, or educational expenses, or even for paying taxes. With more involvement by NGOs in the form of training workshops to assist in farm credits and to inform farmers about the undesirable nature of forward-selling, this method of sale is decreasing over time. According to one survey in the two subdistricts of North Molo and

South Molo in TTS, 3% of farmers used this method in 2000 (Leki and Wadu 2000).

Per tree sale at harvest

This method is used at harvest time — mandarins are sold by the tree, and farmers are not involved in the packaging, transport and sale of individual fruit. When mandarins are ready to harvest, farmers go to traders, or vice versa, and ask for the price per tree for the mandarins. Traders may harvest in stages, depending on the ripeness of the fruit on the trees. In general, traders harvest twice. As in the forward-sale situation, traders own the crop after agreement and farmers are obligated to look after the trees between the first and final harvest. According to one survey in TTS (Leki and Wadu, 2000), the price is about IDR75,000/tree, but according to one farmer leader, the price could be about IDR150,000–200,000 in Oelbubuk village. Farmers are generally content with this price because it is close to what they can get if they sell by themselves, after taking into account all the expenses, e.g. transport, packaging, renting a stall etc.

There are several reasons why farmers sell by per tree rather than by weight at harvest time:

- there are no harvesting costs to farmers
- farmers are saved the trouble of transportation, grading and postharvest loss
- farmers have little information about the price of mandarins in town — selling by tree avoids the risk of receiving an unexpectedly low price
- farmers can sell in a larger volume by tree than by weight, hence saving labour costs.

There are two other social reasons that farmers choose this method of sale. Selling by the tree at harvest time is possible when the farmers and traders involved have a long-standing, good relationship. The trader needs to trust that the farmer will look after the trees after the first harvest and that no stealing will occur. Farmers, of course, rely on traders to give a fair offer. Financially better-off farmers are more likely to use this method because taking mandarins to markets by themselves lowers their social status. Farmers with some prestige are not supposed to be seen to toil themselves and to compete with less better-off farmers in making a living.

Per kilogram sale after harvest

In this method, farmers harvest their own fruit. If required, occasionally they also grade and package the fruit. Farmers or their family members either take their mandarins to traders in the village or town, or directly to markets. In this method of sale, farmers assume several functions in the supply chain and are rewarded more in return.

Factors affecting farmers' choice of selling method

Farmers' use of different selling methods is often related to the size of their mandarin farm, income, price of mandarins or trees at the time, availability of family labour, farmers' educational experiences, length of farming experiences, and distance from the farm to the local market (Leki and Wadu 2000).

Farmers with larger mandarin farms have lower costs per tree and the differences between selling by the tree and by weight are also greater. Hence, farmers with more mandarin trees tend to sell by weight. As stated before, farmers with higher incomes tend to sell their mandarins by the tree at harvest time. Higher prices during the season encourage farmers to sell by weight, as reflected in the recent years. Larger farm households that have more helping hands during the harvesting season are more likely to harvest themselves and sell by weight. Farmers who have more education (formal or informal) are more likely to sell by weight. Similarly, more experienced farmers are more likely to sell by weight. Transport is an issue for farms far away from the subdistrict, district or provincial market. Many villages in North Molo and South Molo are not connected to good roads. Farmers often take mandarins to the market on foot. This is rather inconvenient, as the weather is still a bit wet at the start of the harvesting season in April. Farmers with farms closer to markets are more likely to harvest themselves and sell by weight at the markets.

Supply Chains of Keprok Soe

As indicated in Figure 1, there are two supply chains for mandarins grown in West Timor. About 90% of the mandarins are sold locally; the other 10% are sold to other provinces. In drought years, none are available to sell to other provinces.

Local supply chain

Farmers have several avenues through which they can sell their mandarins in the NTT Province. They can sell by themselves at street stalls at any time, or sell at the subdistrict markets that open once a week. Their fruit can appear at the subdistrict, district, or provincial market through the business activities of traders. The most desirable avenue for growers is to sell directly at the Kupang provincial market run by the government, but no farmers can sell through this channel at this stage. An eligible retailer in the government market must purchase the space of a stand and farmers cannot afford the cost.

At present, there are about 15–20 local traders dealing with mandarin farmers. Some of them sell to retailers and others sell directly in the local market. There are also about 15–20 mandarin retailers at the daily Kupang wet market.

Inter-island mandarin supply chain

Selling mandarins to other, more prosperous islands is the aspiration of the industry in West Timor. This occurred a few times since 1997 when two traders embarked on the venture with farmer groups in Bijeli and Oelbubuk villages. The traders sold to the central market in Jakarta, supermarkets and the food service industry in Bali.

This supply chain currently represents only a small proportion of the outturn. As the supply of Keprok Soe is still not sufficient even to meet current local demand, there is no urgency to work on this supply chain. However, if production increases in the near future as predicted, it will be necessary to address the issues involved. According to the traders, farmers were unable to supply to specifications for the desired maturity level, grading and packaging requirements. Another issue is payment terms. Growers operate on a ‘no cash, no goods’ principle, which makes it difficult for traders to do business as their customers require credit for a few weeks.

Traders as supply-chain managers

Established traders play a key role as channel managers in the supply chain, especially for the inter-island supply chain. The incentive for traders to undertake supply-chain management is partly that Keprok Soe is a premium variety and exclusive to West Timor. For example, one established trader has been actively involved in upstream external resource management with farmers. Under the auspices of NGOs, traders conduct workshops for farmer groups

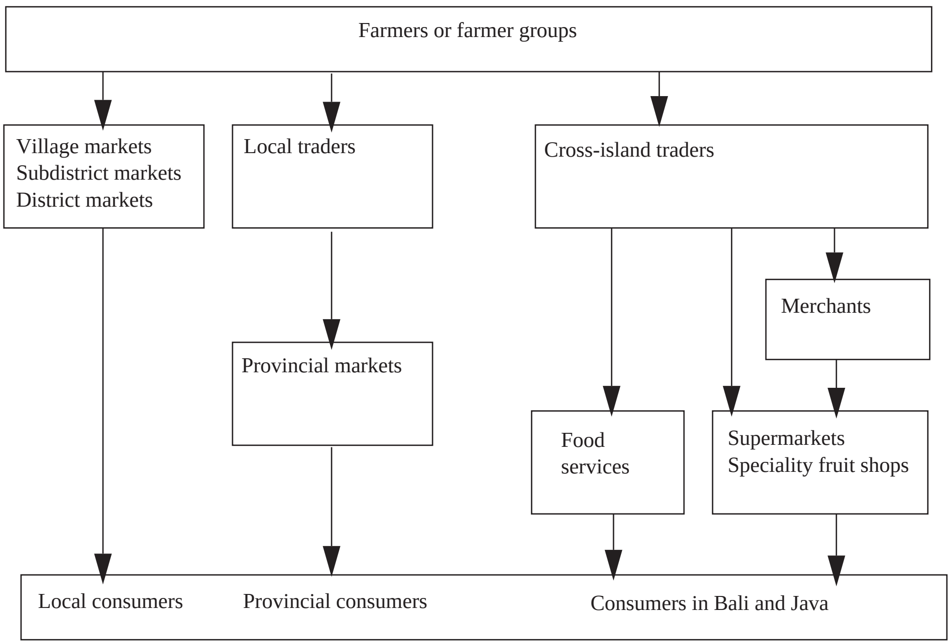

Figure 1. Mandarin supply chains in West Timor.

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in various areas, covering fruit fly control, organic farming principles, re-use of water and postharvest handling to meet market requirements. The traders' requirements for mandarins at the farm level include grading by size and appearance, packaging preferences and maturity level for harvesting. In another instance, a trading company taught farmers how to make wooden boxes, and provided grading guidelines and definitions of maturity levels. Apparently simple guidelines on picking, grading and packing can be difficult for subsistence farmers whose attention is distracted by their immediate need for cash. The entrepreneurial actions that traders have initiated to address farmers' cash shortages include offering working capital and fertilisers to farmers. Repayment is deducted later from the sale of mandarins back to the trader. The presence of NGOs moderates the potentially adversarial relationship between traders and farmers.

It is quite exceptional that traders have motivated farmers to strive for good products, to be competitive and to become champions. Hence, the traders have been observed to play a mixed role of channel manager, information supplier, co-investor and extension officer. These activities and alliances suggest that a reciprocal rather than a win–lose relationship exists (Brandenburger and Nalebuff 1996; Moore 1996). From a power perspective, such a relationship is likely to represent a high barrier to market entry for other serious traders, and thus an advantage of a closed market for the established traders (Cox 1999).

In the recent past, one trading company with a subsidiary in West Timor tried to work with farmer groups to sell mandarins to Java. A complicated model was tested where the company and the farmer groups had a joint account for the payment from Java. Unfortunately, the relationship did not last, mainly for two reasons: improper packaging by farmer groups, and perceived unfair distribution of subsequent loss by farmers. The careful selection of traders or trading companies and the sound functioning of farmer groups are antecedents for a good working relationship between farmer groups and their trading partners.

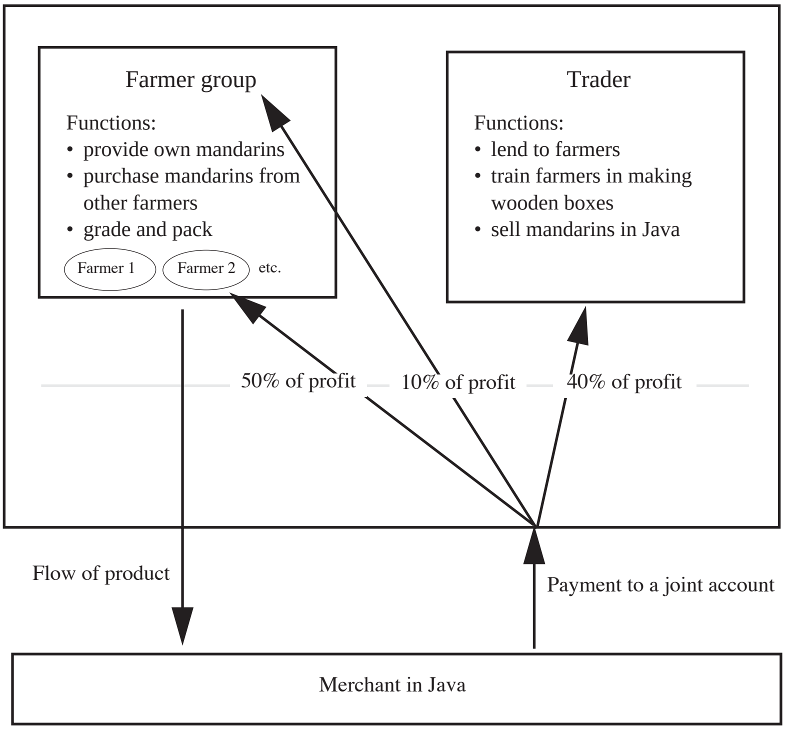

Figure 2. A trial model of alliance between farmers and a trader.

In the late 1990s, an inter-island trading company, with the support of an NGO, tried an alliance model with the farmers (Figure 2). Under this model, the trading company provided training to farmers on grading, packaging and manufacture of wooden boxes. The company also provided loans to farmer groups to purchase mandarins from other farmers. Farmer groups sent products directly to the central market in Jakarta. Payment was sent to a joint account with the agreed breakdown of profits as 50% to farmers, 40% to the trading company and 10% to farmers' groups. However, according to the trading company, due to improper packaging and grading, the price for Keprok Soe was slashed, causing losses to the joint effort. The farmers, suffering from great losses, disagreed on the reason and suspected fraud in the deal.

There are several explanations as to why the alliance did not work out. To start with, it was a rather complicated model for businesses that had never worked together before. Many scenarios were not envisaged, such as the allocation of payment when there were losses. The transaction between the West Timor trading company and the merchant in Jakarta was not transparent to the farmers. As there was no contact between farmers and the merchant in Jakarta, farmers later did not trust the actual amount of payment from the merchant. Farmers needed at least a season to perfect grading and packaging practices before selling their products to markets in other islands that had strict requirements.

Farmers' relationships with local traders

Unlike the relationship with inter-island traders, farmers' relationships with local traders are more transaction-based. According to our interviews, local traders often hid from farmers the price information at the Kupang provincial market. Farmers were often told that the market in Kupang was sluggish and the prognosis would be worse if they would not sell quickly at the price set by traders. Farmers are generally price-takers rather than price-negotiators in this supply chain. One reason that farmers would sell with any price suggested by traders is that farmers generally do not have a good idea about the costs of producing mandarins, hence there is no bottom-line price as a guideline for a desirable price. In fact, many farmers see almost no cost for their produce because there is little farm investment apart from labour and land.

Distribution of benefits

The value chain is not readily available, as most farmers do not keep a record of their costs. Many farmers do not use farm inputs and often ascribe no costs to the production of mandarins if they have not hired any labour. The inter-island value chain shown in Table 1 has been approximated by including the equivalent costs of labour and median-level farm inputs to produce a good grade of mandarins. Interestingly, the farmers' share in the value chain is larger than the traders. As in many other developing countries, traders in Indonesia are not just engaged in

Table 1. A value chain for mandarins in West Timor.

Chain members	Costs and price/kg (IDR)	Margin/kg (IDR)	Relative share (%)
Farmers	Farm-gate price: 4000 Costs: 2000	2000	29
Traders in West Timor	Price: 10,000 Costs: mandarins, 4000 transport, 4000 damage, 500 packaging, 500	1000	14
Traders in other islands	Price: 11,000 Costs: 10,000	1000	14
Retailers	Price: 15,000 Costs: mandarins, 11,000 overheads and damage, 1000	3000	43
Total		7000	100

trading one line of product. They have multiple sources of income by trading in several areas where they see the potential for making a profit. While the farmers' share is about 30% of value created in the chain, this income from mandarins is the main source of revenue for many farmers in TTS and TTU.

Supply-chain Constraints

Production

The mandarin industry in West Timor faces several constraints in the production of Keprok Soe. Overall, farmers lack proper cultural skills and do not use farm inputs to grow good fruit. The area is generally short of water and can be affected by drought, as in 2000. Several NGO projects were designed to install irrigation facilities but for management reasons were not successful in addressing the issues. The industry also faces serious disease challenges, including *Diplodia* canker, pink disease, sooty mould, *Phytophthora*, powdery mildew, citrus greening etc. Inappropriate harvesting methods, involving pulling the fruit from the tree, are still used by farmers — this causes exposed flesh and stress to the tree.

Poor road infrastructure and transport

Currently, fruit is transported on foot, via the public transport system or using the traders' own trucks. With public vehicles, passengers and produce are transported together. Public vehicles run only during the daytime, and only two bags are allowed per passenger. This means of transport is less than ideal, as the daytime heat contributes to fruit losses. In addition, people often sit on the fruit, causing more losses.

Subdistrict markets open once a week (e.g. Thursdays in Kapan subdistrict) and district markets open daily (e.g. the market in Soe — the capital city of TTS — about 20 km from Kapan). Depending on the location of the farm, on average it takes about an hour to take fruit to the subdistrict markets.

Farmers can transport their mandarins by traders' truck, for a fee, but there is a maximum of 10 bags, i.e. 400 kg (per farmer), because traders need to load other fruits and vegetables, such as avocado, banana, onion and pumpkin. The maximum load of one truck is 6000 kg.

When asked why farmers cannot consolidate fruit and hire a private truck, one farmer leader said that they have not looked into this option. However, he expressed that farmers are willing to pay for IDR200,000 for a 3 t load pick-up for fruit to go to Kupang — in other words, about IDR70/kg (or 2% if the price is IDR3500/kg) for transport.

Postharvest losses

Postharvest losses were estimated to be 20%. Most of the losses were due to a lack of proper cold storage. Keprok Soe is planted in the highland areas of 800 m in TTU or above 1000 m in TTS. As the fruit is transported from cooler areas to warmer and humid lowland areas during the daytime heat, fruit ripens fast and unsold fruit deteriorates quickly under ambient conditions.

For fruit sold to other islands, no refrigerated containers were used. There was a shortage of refrigerated containers and priority was given to high-value products, such as meat and seafood.

In 2000, one NGO — Winrock — worked with one trader to refurbish and redesign a second-hand cold storage of a 6 m container with 6 t capacity. Second-hand storage is adequate for fruits and vegetables since they do not require storage below 0°C. However, cold storage is generally unavailable for fresh produce.

For inter-island trade, fruit was graded and packaged twice, either at Kupang, the capital of West Timor, or at the central markets in other islands. At this stage, farmers are unable to set a common standard to meet the grading needs of their customers. This function is unlikely to be fulfilled without the sound performance of farmer groups.

Potential for Chain Strategies

Horizontal integration at the farmer level

There are various kinds of informal social groups in Indonesia, such as youth groups, women's groups, veterans' groups etc. Similarly, in villages, there are informal farmer groups. Members of a farmer group help each other during busy times of crop cycles, such as harvest seasons. They might share equipment with each other. In West Timor, farmer groups are also affiliated with church; one church might have a few farmer groups. Many of the activities of an NGO in West Timor are based on existing farmer groups, as members already know each other well and are easier to mobilise as most of them go to the same church. NGOs' soft-loan programs for farmer groups capitalise on existing farmer groups for implementation through the network of churches.

For farmers to be effectively integrated to improve the efficiency of the supply chain, groups need to develop norms for their members. A popular model of group development described that groups usually go through four stages: (1) the forming stage; (2) the storming stage, where interpersonal conflicts emerge as people try to express their individuality and resist the emerging group structure; (3) the norming stage, where the group starts to evolve methods of working together; and (4) the task-performing stage, where members accept their own and others' abilities and limitations, and organise activities to achieve their goals (Tuckman 1965). It is fair to say that most of the farmer groups in West Timor are in the middle or leaving the second stage. There was some evidence that in certain groups, individual farmers were having problems that affected the activities of the whole group. The challenge for the farmer groups is to recognise and accept group structures and develop norms to organise activities and achieve group goals.

The policy implication is to train extension officers and key farmers in group management skills in addition to production techniques. This support is necessary until group members and the leader have gone through the dependent, the counter-dependent and at the interdependent phases (Banet 1976).

Traders as managers of inter-island supply chains

Keprok Soe was first introduced to other islands in Indonesia by a trader in West Timor, who stated, "I travelled to Java and compared Keprok Soe with mandarins from Madura and Lumajang. I felt Keprok Soe is superior because of its taste, juiciness and skin colour." Traders have been targeted by NGOs for participation in various activities, including training, micro-finance and logistics management. There appears to be a mutual interest for farmers and traders to work cooperatively to improve the production, harvesting, and packaging of Keprok Soe, with a view to selling beyond the local market. The mandarin supply chain in West Timor is operating in a lightly contested environment between cross-island traders and a reciprocal environment between farmers and traders. Certain circumstances facilitated the development of such a relationship between farmers and traders. The demand for Keprok Soe exceeds supply. The exclusive production of Keprok Soe in West Timor assures that both parties retain the benefits of a reciprocal relationship at least in the short term, and the existence of a social network among farmer groups means traders need to communicate effectively with only the groups' leaders. The involvement of NGOs as third parties in the chain provides funding and opportunities for traders and farmers to interact and to address the serious disease problems which threaten the medium-term sustainability of the industry. Finally, at this stage, both farmers and traders will not and could not integrate backward or forward to further appropriate value in the supply chain.

In developing countries, as products are pushed through the channel, the business skills and foresight of traders are crucial to the linkage between farmers and retailers, and consequently the success of a chain. Traders can work better with farmer groups that are at the task-performing stage, or at least at the norming stage.

Branding

Until now, Keprok Soe has been marketed under the traders' own names, losing its identity. While Keprok Soe is considered as a superior product, no effort has been made to market the product. Because of the high transportation costs and the exclusiveness of Keprok Soe to West Timor, an ultimate marketing strategy would be to sell the product as 'Keprok Soe' (mandarins from Soe) rather than just as Keprok (mandarins). This would reduce the risks and uncertainties for consumers and businesses purchasing the fresh produce. In this environment, a good, consistent product identifiable by a brand may lead to a marketing advantage (Owen et al. 2000). However, one issue is that such effects might be difficult to gauge, as the identity of the produce can be lost at the retail level since fresh produce is often not packaged.

To build capacities for developing these strategies, this project implemented two hands-on training workshops on marketing and production, and radio-broadcasted related issues. The project purposefully invited an inter-island trader to conduct training on production, packaging and grading. Awareness of the benefits of horizontal integration at the farm level was raised through farmers working together under the project activities. Preharvest and postharvest

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training workshops have provided the industry with the necessary knowledge and skills for potential branding of Keprok Soe.

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