

# An Analysis of the Mango Value Chain in Son La Province, Vietnam

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**Abstract:** The study aims to analyse the mango value chains in Son La province, Northwest Vietnam. Based on both secondary and primary data, and using various analytical methods including descriptive statistics, comparative analysis and forecasting, the research show that Son La province has 15,550 ha of mango and the total output around 31,276 tons in 2019. There are three types of producers of mango in Son La province which included smallholders and semicommercial whose mainly growing local and improved varieties on less than 3 ha of land; and commercial farmers – growing improved mangoes on at least 3 ha of land. Farmer, Wholesaler, Retailer, Cooperative and Company are main sectors in value chain of mango in Son La province. The market channel show that the largest share of mango production is consumed fresh and main export market is China (over 90% of total output). Smallholder farmers realize gross margins of close to USD1, 892.80 per hectare, while semicommercial farmers realize close to USD 2,500 per hectare. However, the challenges of mango value chain in Son La included the natural disaster and diseases; the spoilage and lack of reliable markets. To improve the mango value chain the local government need for investments in infrastructure including transport, power, irrigation, and communication. Besides, investments in research and extension on mango production and marketing will be critical.

**Keywords:** Mango production, mango value chain, Son La province.

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## 1. Introduction

Mango (*mangifera indica L.*) is a tropical evergreen fruit tree. Mangoes are known to be high in minerals, fiber, vitamins, and provitamins (Prospectiva, 2015). As Calatrava-Requena (2014) noted, mangoes are the fifth most consumed fruit in the world after citrus, banana, grapes, and apples, and therefore, contribute to incomes of various value chain players. Mango is a high-value crop that is traded on domestic, regional - and increasingly international - markets.

Son La is a mountainous province in the Northwest region of Vietnam. Its agricultural land area is 355,000 ha (accounting for 27.4% of the total)

with many different climatic sub-regions suitable for developing a variety of fruit trees in large scale. The total area of fruit trees is 70,327 hectares in 2019, mainly including longan, mango, avocado, orange, plum, passion fruit, banana. The total fruit production of the province was about 246,970 tons in 2019 (*Department of Agriculture and Rural Development of Son La, 2019*).

Acknowledged as the province with largest area of mango production in the North of Vietnam, Son La province currently has 15,550 ha of mango that is grown in almost all districts and provides output around 31,276 tons in 2019. According to the Provincial Agricultural Masterplan to 2020, Mango is considered main product to generate income in the agricultural sector. Besides, the province's agriculture sector plan targeted a five-fold increase period 2015 to 2020 at an 10.0% average annual growth rate (*Department of Agriculture and Rural Development of Son La, 2019*). As such mango value chain can be seen as exemplary for examining the issue of fostering smallholder-inclusive value chains, enhancing sustainable entrepreneurship, and allows for conclusions about the development of different models of mango value chains in Son La province.

The main export market of mango products in Son La is China, which may lead to fluctuations in prices, and low and unsustainable income for mango farmers, greatly affecting the livelihoods and living conditions for people in this region. The largest share of mango production is traded and consumed fresh. Over 90 percent of mango production is grown by smallholder farmers with low investment capacity. Besides, the linkage between producers and other stakeholders in the value chain is not tight.

The Local Government of Son La prioritized of key value chains to sustainable development of mango. Therefore, particularly highlights the need for studies and consultations to identify value chains with highest potential for growth and to inform private sector players interested in investing in agriculture about such value chains. This value chain study will inform government and private sector investors on the efficacy of the mango value chain as an investment option, propose strategies to improve the economic value of the chain, and increase income for producers and other stakeholders in the Son La mango chain.

## **2. Methodology and Data**

Data were collected with 230 stakeholders which included 160 mango producers (50 smallholders— less than 1 ha of land; 60 semicommercial— on 1 to 3 ha of land; and 50 commercial farmers— at least 3 ha of land) from June to August of 2019, six government officials, three input suppliers, 30 mango whole sellers, 25 mango retailers, five food chain stores representatives, and four transporters. In the survey, household were

queried regarding all information which related mango production and value chain, and aspects of their demographic information. Only adults were interviewed, and interviewers were instructed to interview the head-of-household. The semi-structured questionnaire for the smallholders is composed of a series of open-ended and closed questions. It includes several components, including smallholder characteristics, investments made in mango production over the past five years and efficiency of commercialization, as well as information on the organization of the chain, and perceptions on current situation and trends. For focus group discussions and interviews with other stakeholders in the chain, an interview guide was prepared with open questions. This enabled an informal but guided conversation with respondents. Besides, the second approach direct interviews with local managers, officers, businessman, company who are sector in value chain of mango.

Descriptive statistics were used to analyze the data collected to reviews and conducting semi-structured and key informant interviews with mango industry players. Secondary data sources included the Agriculture Production Estimates Survey (APES), the Agricultural Market Information System (AMIS).

A Strengths, Weaknesses, Opportunities, and Threats analysis and profitability analyses at the farmer and trader levels were also conducted.

### 3. Result

#### 3.1. Mango production

The total area of mango is 15,550 ha in 2019 (accounting for 22.11% of total fruit area). Most of the mangoes produced in Son La are of improved varieties (with 68%). Only 32% are of local varieties (Figure 1 & 2).

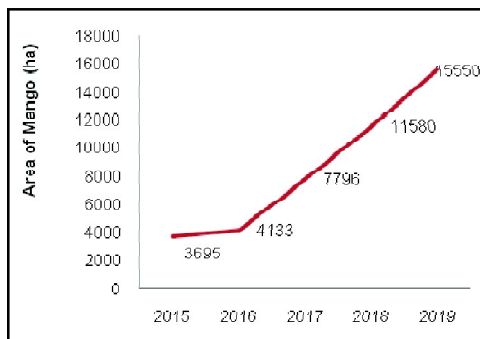


Figure 1: Development of mango area in Son La province from 2015-2020

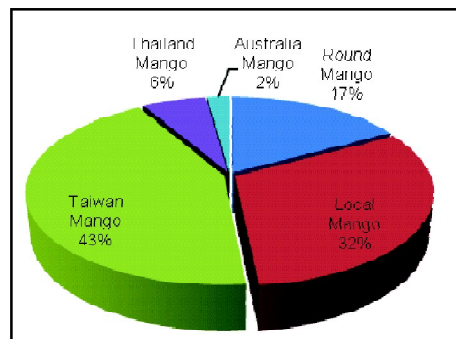


Figure 2: Area structure of mango varieties in Son La province in 2019

Source: Department of Agriculture and Rural Development of Son La, 2019

The report of mango production show that, the total output of Mango is 31,276 tons and valuable of mango exported more USD 4.5 million (with 6,100 tons) in 2019 (figure 3). The largest global markets for mango (for fresh fruits and juice extracts) are China, USA, EU, and Australia. Son La has 44 Production Unit Code (PUC) of mango for exporting, meanwhile, 30 PUCs of Mango for China market and 14 PUCs for EU, USA, and Australia market. In 2019, there are 39 safe fruit supply chains with a total production area of 807.21 hectares, with an output of 8,614 tons per year.

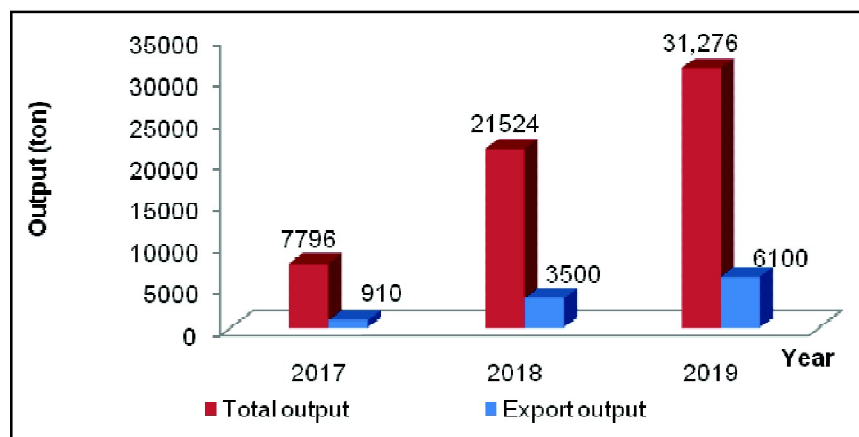


Figure 3: Total output and Export of Mango in Son La province

Source: Department of Agriculture and Rural Development of Son La, 2019

The largest share of mango production is traded and consumed fresh (over 90% of total output); the remainder is mostly processed into dried mango or juice. The biggest challenge in the mango value chain in Son La province is spoilage and lack of reliable markets.

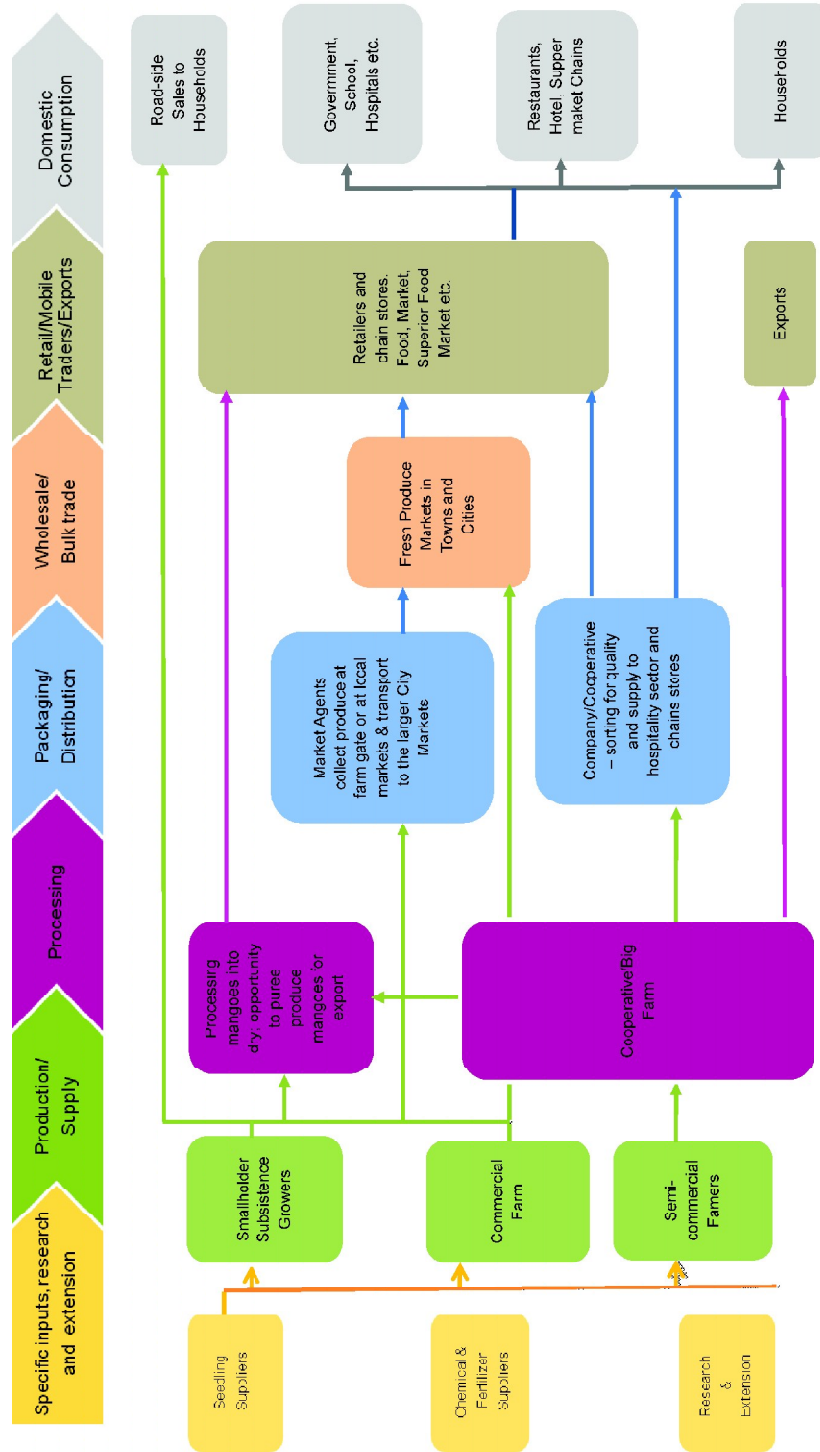
### 3.2. Value chain of Mango in Son La province

Figure 4 above shows the mango value chain map in Son La province. The subsequent sections highlight each of the value chain stages as presented in the value chain map. The mango statistics presented above show that there is potential for growth of the mango industry in Son La. To fully take advantage of international mango markets, there is need to intensify production of improved mango varieties including top working existing local varieties with improved varieties.

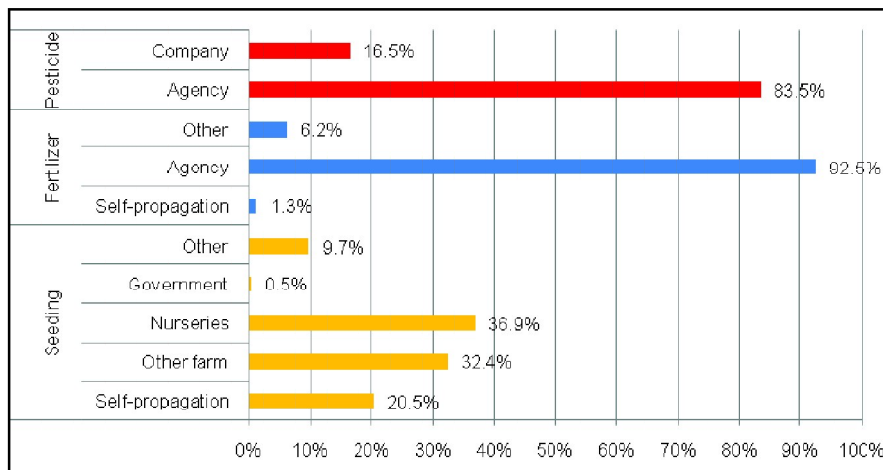
### 3.3. Input Supply

The Ministry of Agricultural and Rural Development of Vietnam has been conducting research in evaluating and propagating high yielding mango

Figure 4: Value chain of Mango in Son La province



varieties. However, there is lack of funding to have any significant impact. Furthermore, there is little dissemination of these high yielding varieties and agronomic knowledge especially on control of pests and diseases. Son La province has taken the initiative to evaluate and propagate high yielding mango varieties for its farm. They are also involved in a grafting/top-working programme for their mango out-grower farmers. Son La has many type of improved varieties mango which are top-working onto existing indigenous tree rootstocks. In addition, Son La province has extension officers who provide farmers with advice on tree maintenance, chemical and manual pest and weed control, and supplementary irrigation techniques.



**Figure 5: Input Supply of Mango production in Son La province**

Source: Estimated from the survey data, 2019

At the seedling level, there are a few farmers who produce mango seedlings in nurseries. Most of these use mango seedlings from local mango varieties and graft them with new high yielding varieties. There is need to spur production of improved varieties demanded in these international markets through investments in research and extension.

### **3.4. Smallholder Farmer Gross Margin Analysis**

Mangoes are grown virtually throughout the whole province, mainly by smallholder farmers. Farmers rely solely on the annual rainfall and natural water for their trees' survival and production. The two main local varieties are Round and Hoi. Improved varieties of mango included Taiwan, Australia and Thailand Mango.

**Table 1: Smallholder Farmer Gross Margin Analysis**  
(USD/ha)

#	Variable	Smallholder	Semicommercial private	Semicommercial out-grower
1	Production Cost	475.42	491.95	502.54
	Weeding	83.90	46.61	40.68
	Chemicals	99.58	27.54	28.81
	Spraying	47.46	43.22	44.49
	Irrigation	14.83	23.73	36.02
	Fertilizer	150.85	98.31	93.64
	Harvesting	0.00	152.54	152.54
	Hire Labor	0.00	33.90	49.15
	Others	78.81	66.10	57.20
2	Revenue	2368.22	2821.61	3066.10
3	Gross Margin	1892.80	2329.66	2563.56
4	Profit Margin	79.92%	82.56%	83.61%

Source: Estimated from the survey data, 2019

There are three types of producers: smallholders—mainly owning local varieties and a few improved varieties; semicommercial—operating on private basis or out-grower arrangements and mainly growing improved varieties; and commercial farmers—growing improved mangoes on at least 3 ha of land. Estimates presented in table 1 do not include establishment costs as most trees were planted at least four years ago. The estimates however, include maintenance costs. The results show that smallholder farmers realize Gross Margins of close to USD1892.80 per hectare or 79.92% profit margin, while semicommercial farmers realize close to USD2500 per hectare or 83.61% profit margin.

### 3.5. Mango Marketing

There are four main market channels for mangoes in Son La province. The first-market channel is informal and involves farmers selling to farm vendors/traders who in turn sell the produce to town/city market vendors. The second involves farmers harvesting mangoes by themselves and selling them at roadsides near their farms or homes (free trade). The third involves semi-commercial farmers selling directly to the Cooperative/Company at a premium price of about USD 0.85/kg. These farmers transport their mangoes by themselves. The fourth involves Mangoes deploying trucks to collect mangoes at determined collection points near farmers' farms. In each of the market channels, when transporters are involved, they charge about USD300 for a 100km trip on a 3.5 tons truck. The transporters spend about USD100 on fuel and USD200 on the driver (representing a 50% profit margin/trip). The percentage of mango sold to traders who collected in

farm is the highest (with 55.48%), traders at the collection site (24.14%) (figure 6).

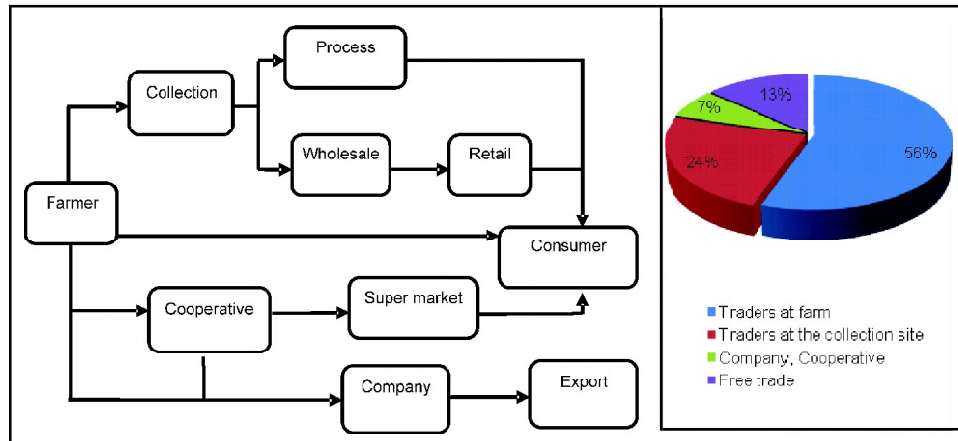


Figure 6: Market channel of Mango in Son La province in 2019

Source: Estimated from the survey data, 2019

The market channel indicate that the increased focus on domestic and China markets: These markets are growing and, as they demand less stringent quality requirements, they are easier to access for the smallholder farmer.

The biggest export market of Son La mango is China (greater than 90% of total mango export in 2019). This chain model provides a great opportunity for resource-poor farmers in the region, and can result in an improvement in incomes. However, the system is relatively young, and the sustainability of the chain model has to be demonstrated over time. One of the current challenges is that producers are dependent on the lead firms whose exported to China.

**Local markets:** The fruits that are sold on local markets have no stringent quality requirements and consumers on local markets do not prefer certified or highly homogeneous supplies of mangoes.

**Processing/modern urban end markets:** Some smallholders predominantly produce mangoes to be sold on domestic/regional modern urban markets, or to be used for processing into juice or dried mango. The quality requirements for their mangoes are usually less rigorous than for export fruit, especially with respect to visual fruit appearance, and certification is not a prerequisite.

**Export markets:** Mango is a highly perishable fruit and vulnerable to pests and diseases, such as fruit flies (a quarantined pest) and anthracnose.



In order to deliver to exporters of fresh or fresh-cut mangoes (especially in the EU, Australia and the United States), farmers need to comply with stringent quality norms and standards and typically require certification of their mangoes.

### 3.6. Whole Selling and Retailing

Approximately 70% of mangoes are sold to farm vendors/traders. The farmers themselves sell the remaining 13% directly to the public (along the roadside) and 7% to company or cooperatives. By the time of data collection, wholesale traders were selling their mangoes at an average price of USD0.57/kg while retailers were selling at an average price of USD0.70/kg. Table 2 below shows a gross margin analysis for wholesalers and retailers.

**Table 2: Wholesaler and Retailer Gross Margin Analysis**

<i>Variable</i>	<i>Wholesale (USD per ton)</i>	<i>Retail (USD per ton)</i>
Stock purchases	573.06	697.04
Transportation	93.03	94.83
Packaging	13.62	7.03
Labor	19.73	13.35
Market Fees	12.93	9.26
Storage	1.93	3.45
Other cost	2.36	0.25
Revenue	794.51	997.47
Gross Margin	77.86	172.26
Profit Margin	9.80%	17.27%

*Source:* Estimated from the survey data, 2019

Local and improved mango varieties are sold in the expanding retail chain-store network. Whole sellers make a Gross Margin of about USD77.86 per ton representing 9.80% profit margin while retailers make about USD172.26 per ton representing 17.27% profit margin.

### 3.7. Mango processing

Son La Mango is concentrating on exporting fresh improved variety fruits, and producing dried mangoes. VietPhap company is the only large-scale fruit production and processing facility in Son La processing mangoes into a concentrated dried from local and improved mango varieties for domestic consumption and eaten as a snack, preserve.

There is also some small-scale and cooperatives processing of mangoes especially local mangoes in the communities. The Son La has opportunity to puree produce mangoes for export and local market.



Figure 7: Type of dried mango products in Son La province

### 3.8. Challenges Faced by Value Chain

The major production challenge faced by farmers is natural disaster and diseases in the farm. There are more 70% of the interviewed farmers indicated that their major challenge is the absence of stable markets. Besides, traders highlighted perishability of mango as a major challenge they are facing.

Son La is a mountain zone which away from market and cities centers. On the other hand, the traffic infrastructures aren't good. So, the farmers and traders also lamented the high cost, long time of transportation and low selling prices as traders are forced to sell their mangoes within 3 to 5 days of purchase before they start rotting. There is need to improve handling and transportation of mangoes which included electricity, irrigation, communication, and roads to reduce post-harvest losses. Table 3 shows the estimated quantity of mangoes that get spoiled of farmers and traders.

Table 3: Post Harvest Losses per season (1 year)

Postharvest losses	Quantity (Kg)	Value (USD)
Farmer	1260	613.98
Wholesale	312	115.44
Retail	760	478.80

Source: Estimated from the survey data, 2019

The dataset also shows that farmers were harvesting an average of 1.5 tons of mangoes in a season. At the wholesale level, wastage was estimated at 3% per season and at the retail level it was estimated at 21% per season.

Both from the interviews and the focus group meetings it became obvious that producers are not satisfied with their revenues from mango production. The main reason for this is quality constraints (especially fruit flies) lowering the value of the fruits, as well as the poor negotiation position with the tradeswomen coming from urban areas or China market. There are many reasons to explain this problem. But the most important is the fruit quality issues and the lack of a guaranteed market or contract, producers often have to accept the low price imposed by the buyers

coming to their orchards. The producers suspect that traders exaggerate the quality problems to lower the price, or to refuse payment for fruit sold on credit.

### 3.9. SWOT Analysis of the Mango Value Chain

The Strengths, Weaknesses, Opportunities, and Threats in the mango value chain are summarized below table.

**Table 3: SWOT analysis of the Mango value chain in Son La province**

<i>Strengths</i>	<i>Opportunities</i>
<ul style="list-style-type: none"> <li>• Good fertile soils and favorable climate</li> <li>• Availability of new desirable varieties such as Thailand, Australia, Taiwan mango</li> <li>• Support from Government and Companies/Cooperatives</li> </ul>	<ul style="list-style-type: none"> <li>• Booming chain supermarkets that provide an opportunity for medium scale to large scale producers.</li> <li>• Existence of international markets (China, USA, UK, India, Asia) that Son La mango can target.</li> </ul>
<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• No structured market system</li> <li>• Limited access to finance</li> <li>• Lack of market information</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Lack of government funding for research and extension support.</li> <li>• Lack of enabling environment (electricity, rail, roads, irrigation, access to finance, etc.).</li> <li>• Climate changes</li> </ul>

## 4. Conclusions

There are about 95 percent of the producers plan to continue mango production in Son La province in the future. Mango-growing has become a part of their lifestyle, the orchards required high initial investments and farmers consider the mango orchards to be a main part of their household livelihoods.

Following to Provincial Agricultural Master Development plan to 2025, the total area of mango around 100,000 ha and output will be achieved 1.1 million tons. The consumption pressure is the biggest in sustainable development of Son La mango, especially to find new market and attraction the sectors in mango value chain are the most important. Son La has great potential to develop the mango value chain with existence of high value international markets. There are many sectors whose attend on orthodox and non-mainstream in value chain to develop of mango production. Meanwhile, investments in research and development and extension on mango production and marketing will be critical. There is also need for investments in infrastructure including transport, power, irrigation, and communication.

Achieving that result, the Ministry of Agriculture and Rural Development proposed the Government and ministries and agencies to have policies for encouraging investment in fruit processing facilities, such as irradiation, steam treatment, facilitating export enterprises to expand their markets and improve the capacity of mango value chain in Son La province.

The study did reveal that quality issues of mango are an emerging constraint. Therefore, the conclusion that more feasible upgrading strategies might be to target domestic and China markets with less stringent norms and standards.

In addition, there is need to expand value addition initiatives including mango drying and puree production to make full use of the many mangoes that get wasted during seasons of high supply. Lastly, there is need to improve harvesting and transport techniques to limit post-harvest losses.

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Appendices

Appendix 1: Map of Son La province

