Supply Chain Analysis of Philippine Fresh Mangoes

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Objectives

1. To provide an overview of the different components and stakeholders involved in the fresh mango supply chain;
2. To present the PNS, Codex standards and quality and safety standards set by selected importing countries for Philippine fresh mangoes;
3. To analyze the costs and returns in mango production and value chain for fresh mangoes;

Objectives

4. To analyze the problems and constraints of the key players in the fresh mango supply chain; and
5. To recommend policy directions and required strategic improvements to enhance the level of productivity, marketability and global competitiveness of Philippine fresh mangoes in the supply chain.

Introduction

- The Philippines is the 7th largest mango producer in the world.
- Production (2007): 1.02 million mt
- Area (2007): 184,174 ha
- Share in total production:

  Luzon (66%), Mindanao (21%), and Visayas (13%)

Introduction

- The Philippine Carabao mango, known as Manila Super Mango, accounts for 97% of total mango production in the country.
- This is the main fresh mango variety exported by the Philippines.
- Total volume of fresh mango exports (2007):
  6% of total production;
  62% of total mango exports
- Total value of fresh mango exports (2007):
  US$ 23.29 million
- Top export destinations: Japan and the United States

Overview of the Fresh Mango Supply Chain

Components of the Fresh Mango Supply Chain and Stakeholders Involved

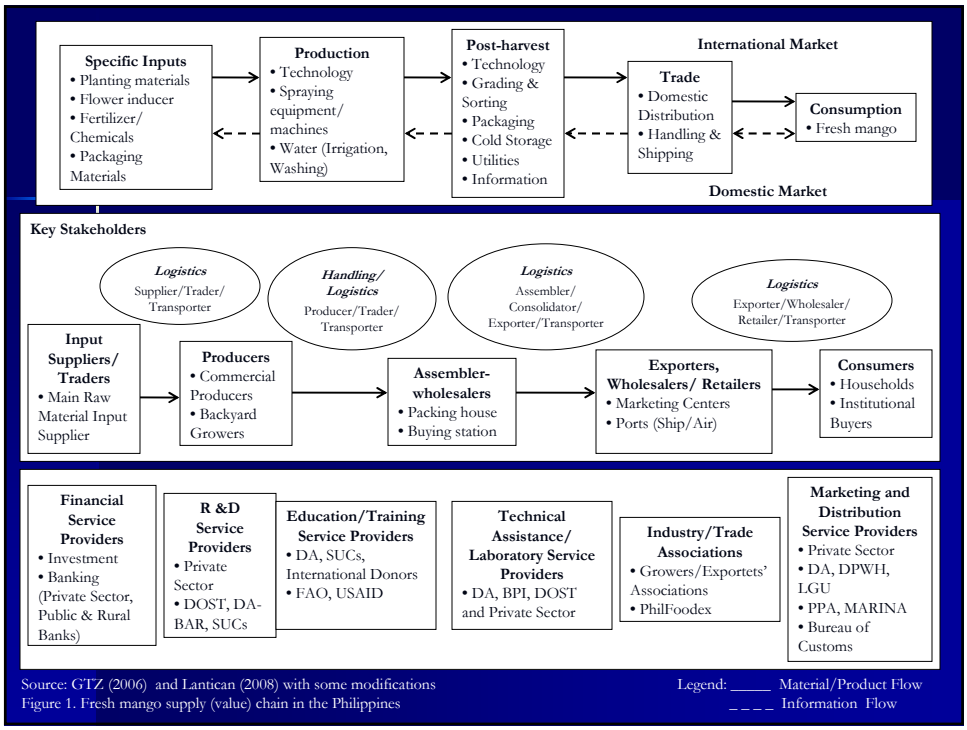
Supply Chain

- Supply chain is defined as a network of independent organizations working together to control, manage and improve the flow of inputs/materials, products and information from suppliers to consumers.
- Four major sub-sectors in the fresh mango supply chain:
  (1) input/production;
  (2) post-harvest;
  (3) marketing and trade (domestic and international); and
  (4) consumption.

Supply Chain

- Nine key players in the fresh mango supply chain:

(1) Input suppliers
(2) Growers (backyard and commercial)
(3) Sprayer-traders
(4) Assembler-wholesalers/consolidators
(5) Exporters
(6) Wholesalers
(7) Wholesaler-retailers
(8) Retailers
(9) Consumers



Philippine National Standard vs CODEX Standard

Similarities

Definition of Produce

PNS 13:2004	CODEX STAN 184-1993, AMD. 1-2005
Mangifera indica Linn of the Mangiferae family (for PNS) and of the *Anacardiaceae* family (for Codex)	

Classification

PNS 13:2004	CODEX STAN 184-1993, AMD. 1-2005
Extra Class Mangoes of superior quality and have the characteristics of the variety **Class I** Mangoes of good quality and have the characteristics of the variety **Class II** Mangoes that do not qualify for inclusion in the higher classes but satisfy the requirement of Class II	

Presentation

PNS 13:2004	CODEX STAN 184-1993, AMD. 1-2005
Uniformity Mangoes of same origin, variety, quality and size	
Packaging Mangoes packed in suitable containers	**Packaging** Mangoes packed in suitable containers in compliance with the Recommended International Code of Practice for Packaging and Transport of Fresh Fruits and Vegetables (CAC/RCP 44-1995, Amd. 1-2004)

Hygiene

PNS 13:2004	CODEX STAN 184-1993, AMD. 1-2005
In accordance with the Recommended International Code of Practice-General Provisions of Food Hygiene (CAC/RCP 1-1969, Rev. 2-1985) and other relevant Codex texts such as the Codes of Hygiene Practice and Codes of Practice by Codex	

Differences

Minimum Requirements

PNS 13:2004	CODEX STAN 184-1993, AMD. 1-2005
1. Mature and its shape characteristic of the variety; 2. Reasonably clean and free from any visible foreign matter; and 3. Free from diseases and insects, and free from any injury.	1. Whole; 2. Sound, produce affected by rotting or deterioration such as to make it unfit for consumption is excluded; 3. Clean, practically free of any visible foreign matter; 4. Practically free of damage caused by pests; 5. Free of abnormal external moisture, excluding condensation following removal from cold storage; 6. Free of any foreign smell and/or taste; 7. Firm; 8. Fresh in appearance; 9. Free of damage caused by low temperatures; 10. Free of black necrotic stains or trails; 11. Free of marked bruising; 12. Sufficiently developed and display satisfactory ripeness; and 13. When a peduncle is present, it shall be no longer than 1.0 cm.

Size Classification

PNS 13:2004	
Size	Weight (g)
Extra Large	> 350
Large	300-349
Medium	250-299
Small	200-249
Super Small	160-199

CODEX STAN 184-1993, AMD. 1-2005	
Size Code	Weight (g)
A	200-350
B	351-550
C	551-800

Marking or Labeling

PNS 13:2004	CODEX STAN 184-1993, AMD. 1-2005
1. Name of produce, variety or commercial type 2. Class and size or number of pieces 3. Net weight (in kg) 4. Name of producer or exporter The words "Product of the Philippines"	Compliance with the requirements of Codex General Standards for the Labeling of Pre-packaged Foods (CODEX STAN 1-1985, Rev. 1-1991) 1. Name of produce 2. Variety or commercial type (optional) 3. Class 4. Size 5.Number of pieces (optional) 6. Net weight (in kg) (optional) 7. Name of producer or exporter and address 8. Identification Code (optional) 9. Country of origin 10. Official inspection mark

Heavy Metals and Maximum Residue Limits

PNS 13:2004

Heavy Metals	Maximum Values (mg/kg)
Lead (Pb)	0.50
Cadmium (Cd)	0.05
Mercury (Hg)	0.03

Pesticide	MRL (mg/kg)
Carbendazim	2.0
Prochloraz	2.0
Propiconazole	0.05
Triadimefon	0.1 (*)

CODEX STAN 184-1993, AMD. 1-2005

The maximum levels for heavy metals established by the Codex Alimentarius Commission

Pesticide	MRL (mg/kg)
Carbendazim	**2.0**
Dimethoate	1.0
Dimthiocarbonates	2.0
Imidacloprid	0.2
Propiconazole	**0.05**
Pyraclostrobin	0.05
Thiabendazole	5.0
Triadimefon	**0.05**
Triadimenol	0.05

Sources of basic information: FAO and BAFPS as cited by Lantican (2008)

Import Requirements and Regulations in Selected Importing Countries

Import Requirements and Regulations in Selected Importing Countries

Hong Kong

- Less strict
- No plant import license or phytosanitary certificate required for imports of fruits for consumption
- Adopts the Maximum Residue Limits (MRLs) and Extraneous Maximum Residual Limits (EMRLs) for nine types of pesticides but has higher MRL for two types of pesticides (e.g., carbendazim and thiabendazole) than Japan

China
Undergo VHT before entering the market

Disadvantages to Filipino exporters:

1. VHT is costly, entailing additional expense of at least US$ 0.40/kg;
2. VHT has an effect on the taste and appearance of fresh mangoes if fruits are harvested immature;
3. Vapor heat treated mangoes necessitate refrigerated vans for transport and this incurs additional cost; and
4. The treatment is also time consuming.

DA sent experts/exporters to suggest extended HWT instead of VHT. Chinese has agreed provided their inspectors examine the effectiveness of extended HWT.

Japan

- Very strict requirements (lower MRL)
- Requires submission of import notification form to the Quarantine Station of the Ministry of Health, Labor and Welfare (QS-MHLW) in accordance to Article 27 of the Food Sanitation Law.
- The procedures of import notification of mango are as follows:

(1) Consultation at an imported food inspection section of the quarantine station prior to the import;
(2) Preparation of documents for import notification;
(3) Arrival of cargo;
(4) Submission of an import/on-line import notification form;
(5) Document examination at QS-MHLW;
(6) Issuance of certificate of notification;
(7) Custom clearance; and
(8) Domestic distribution (Japan External Trade Organization 2008).

New Zealand

- Strict requirements (undergo VHT)
- Pre-export requirements include the inspection of the consignment for visually detectable regulated pests with a 95% confidence level and that no more than 0.5% of the units in the consignment are infested; testing of the consignment for quarantine pathogens; and the bilateral quarantine arrangement and phytosanitary certificate
- Documents required to prove that fruits are fit for human consumption
- Each importer is required to keep the following documents:

(1) Food safety certification relating to fruit importation;
(2) Supplier contact details and product details;
(3) Inventory records;
(4) Applicable temperature records, especially for storage and transportation purposes;
(5) Relevant test results; and
(6) Any related food safety risk analysis work

United States

- Open market for Guimaras mangoes in limited states
- Mangoes from all other areas of the Philippines except Palawan are eligible for importation into Hawaii and Guam only
- Mangoes must be treated for fruit flies of the genus Bactrocera with vapor heat under the supervision of an inspector in accordance with the set import regulations
- Mangoes inspected in the Philippines are subject to reinspection at the port of first arrival in the United States as provided in §319.56–3

United States

- Aside from the pesticide residue limits indicated in the Codex standards, the United States has indicated its MRL for five additional chemicals used in mango production and post-harvest:

(1) Fenpropathrin (1.0 ppm);

(2). Fludioxonil (0.45 ppm);

(3) Glyphosate (0.2 ppm);

(4) Myclobutanil (3.0 ppm); and

(5) Tebuconazole (0.15 ppm for mango at post-harvest) (G/SPS/N/USA/1469/Add.1)

Cost and Returns Analysis

Cost and Returns Analysis: Philippines (BAS 2007)

	PhP/ha	% share
Gross Returns	121,430	
Cash Costs	30,266	60.12
Non-Cash Cost	20,076	39.88
Total Costs	50,342	100.00
Net Returns	71,088	
Net Profit-Cost Ratio	1.41	

Cost and returns of a mango farm in Batangas, 2008

	Php/ha	Php/kg
Gross Returns[a]	121,280	20.45
Total costs[b]	42,496	7.18
Net Returns	78,784	13.27
Net profit-cost ratio	1.85	1.85

[a] Farmgate price: Php 20.45/kg; yield/ha: 5,930 kg
[b] Costs include material inputs, labor, depreciation and interest on capital

Value Chain Analysis

Value Chain Analysis

- Analysis of the value chain of mangoes focuses only on limited number of marketing channels due to the difficulty in obtaining reliable data from the exporters
- Two distribution channels in Batangas and only one in Davao del Sur are covered in the value chain analysis

Value Chain Analysis: Batangas

Marketing channel 1 is composed of five marketing participants:

- Grower
- Sprayer-trader
- Manila-based wholesaler
- Wholesaler-retailer
- Retailer

Value chain analysis of mangoes grown in Batangas and sold to Manila-based wholesaler, wholesaler-retailer and retailer

	Amount (Php/kg)	% share of net income
Farm		
Farmgate price	20.45	
Grower's share of gross sales (25%)	5.11	
Net income	3.47	10.92
Sprayer-trader's share of gross sales (75%)	15.34	
Net income	8.16	25.68

Batangas mangoes sold to Manila-based wholesaler, wholesaler-retailer and retailer

	Amount (Php/kg)	% share of net income
Sprayer-trader		
Buying price	20.45	
Total costs	24.30	
Selling price	30.00	
Net income	5.70	17.94

Batangas mangoes sold to Manila-based wholesaler, wholesaler-retailer and retailer

	Amount (Php/kg)	% share of net income
Manila-based wholesaler		
Buying price	30.00	
Total costs	31.00	
Selling price	33.00	
Net income	2.00	6.29

Batangas mangoes sold to Manila-based wholesaler, wholesaler-retailer and retailer

	Amount (Php/kg)	% share of net income
Wholesaler-retailer		
Buying price	33.00	
Total costs	34.60	
Selling price	40.00	
Net income	5.40	16.99

Batangas mangoes sold to Manila-based wholesaler, wholesaler-retailer and retailer

	Amount (Php/kg)	% share of net income
Retailer		
Buying price	40.00	
Total costs	42.95	
Selling price	50.00	
Net income	7.05	22.18
Total net income	31.78	100.0

Value Chain Analysis: Batangas Channel 1

	% Share of Net Income
Farm: Grower	10.92
Sprayer-trader	25.68
Sprayer-trader	17.94
Manila-based wholesaler	6.29
Wholesaler-retailer	16.99
Retailer	22.18
Total	100.00

Batangas mangoes sold by sprayer-traders to FTI-based exporter

	Amount (Php/kg)
Farm	
Total costs	8.82
Farmgate price	20.45
Net income	11.63
Grower's share (25%)	2.91
Sprayer-trader's share(75%)	8.72

Batangas mangoes sold by sprayer-traders to FTI-based exporter

	Amount (Php/kg)
Sprayer-trader	
Buying price	20.45
Total costs	22.65
Selling price [a]	32.50
Net income	9.85

[a] Sold 25 % of the marketable supply with XL and L sizes to the exporter

Value chain analysis of mangoes grown in Davao del Sur

	Without Hot Water Treatment		With Hot Water Treatment	
	Php/kg	% Share of NI	Php/kg	% Share of NI
Farm				
Total costs	6.87		6.87	
Farmgate price	28.00		28.00	
Net income	21.13		21.13	
Grower's share (30%)	6.34	18.03	6.34	17.36
Contract sprayer's share(70%)	14.79	42.05	14.79	40.51

NI = Net Income

Value chain analysis of mangoes grown in Davao del Sur

	Without Hot Water Treatment		With Hot Water Treatment	
	Php/kg	% Share of NI	Php/kg	% Share of NI
Shipper				
Buying price	28.00		28.00	
Total costs	30.89		32.34	
Selling price	34.50		34.50	
Net income	3.61	10.27	2.16	5.92

Value chain analysis of mangoes grown in Davao del Sur

	Without Hot Water Treatment		With Hot Water Treatment	
	Php/kg	% Share of NI	Php/kg	% Share of NI
Wholesaler/Consignee				
Buying price	34.50		34.50	
Total cost	34.75		34.75	
Selling price	36.40		36.40	
Net income	1.65	4.69	1.65	4.52

Value chain analysis of mangoes grown in Davao del Sur

	Without Hot Water Treatment		With Hot Water Treatment	
	Php/kg	% Share of NI	Php/kg	% Share of NI
Retailer				
Buying price	36.40		36.40	
Total costs	43.22		40.43	
Selling price	52.00		52.00	
Net Income	8.78	24.96	11.57	31.69
Total net Income	35.17	100.00	36.51	100.00

Value Chain Analysis: Davao del Sur

	% Share of Net Income W/o HWT	W/ HWT
Farm: Grower	18.03	17.36
Contract sprayer	42.05	40.51
Shipper	10.27	5.92
Wholesaler/Consignee	4.69	4.52
Retailer	24.96	31.69
Total	100.0	100.0

Problems and Constraints

Input Supply/Production Sub-sector

- High cost of production-inputs (flower inducers, fertilizers and pesticides): 38 out of 51 Batangas mango growers entered into a sharing arrangement with sprayer-traders
- Heavy insect and diseases incidence: leaf hoppers, thrips, tip borer, anthracnose, stem-end rot, scab, cecid fly and capsid bug in Pangasinan and Batangas; tip borer, twig borer, hopper, cecid fly, thrips and capsid bug in Davao del Sur

Input Supply/Production Sub-sector…

- Inadequate knowledge on improved production technologies (e.g., fertilization, pest control, weeding and sanitation, pruning and bagging)
- Limited access to capital for production and expansion needs

Post-harvest Sub-sector

- Lack of collection centers or packinghouse where preparatory activities such as sorting, trimming, delatexing, disinfection of newly harvested fresh fruits or HWT for disease control, air drying, sizing and grading are done
- Limited laboratories/facilities for monitoring pesticide residues: Six regional BPI-National Pesticide Analytic Laboratory (NPAL) - insufficient

Post-harvest Sub-sector ...

- Inadequate knowledge on post-harvest treatments. Mangoes from Davao del Sur and Davao City are susceptible to anthracnose and stem-end rot, which are already present even before harvest (called latent infection), but becomes apparent only as the fruits ripen, usually in the hands of consumers

Marketing and Trade Sub-sector

- Limited supply of quality mangoes for trading in the domestic market (e.g., supermarkets, hotels and high-end restaurants) and export market
- Stringent quality and safety standards set by importing countries: Japan has tightened its quarantine requirements for Philippine fresh mangoes as residue from synthetic chemicals has become their priority

Marketing and Trade Sub-sector…

- Stiff competition with foreign suppliers of fresh mangoes in existing markets. In Asia, Thailand and India are the close competitors of the Manila Super Mango
- High post-harvest losses of mango: Weight loss of mango grown in Davao del Sur but traded in Manila could range from 3.07 to 16.83 percent and rejects from 0.62 to 1.87 percent within two to four days interval of holding mangoes in the stall (BPRE and PHTRC 2008)

Policy Directions

Promotion of the Integrated Pest Management (IPM) in Major Mango Production Areas

- Promotion of IPM through training, field demonstration and farmers' fora
- Close coordination of the DA-Agriculture and Training Institute (ATI) with LGUs in promoting IPM in major production areas
- Promotion of bagging in Luzon to reduce pesticide application besides improving the quality of mango harvest

Provision of Adequate Infrastructure and Support Systems

- Laboratory facilities that will offer affordable fees for pesticide residue analysis
- Upgrade facilities and retool personnel of analytical laboratories of BPI and selected DA-Regional Field Units on Good Laboratory Practices (GLP) in pesticide residue analysis, MRL establishment, and chemical contamination
- Government incentives in the form of cost-sharing and granting of partial exemptions for laboratory equipment that need to be imported by small-and-medium scale investor to conform with plant requirements in HACCP standard

Provision of Adequate Infrastructure and Support Systems…

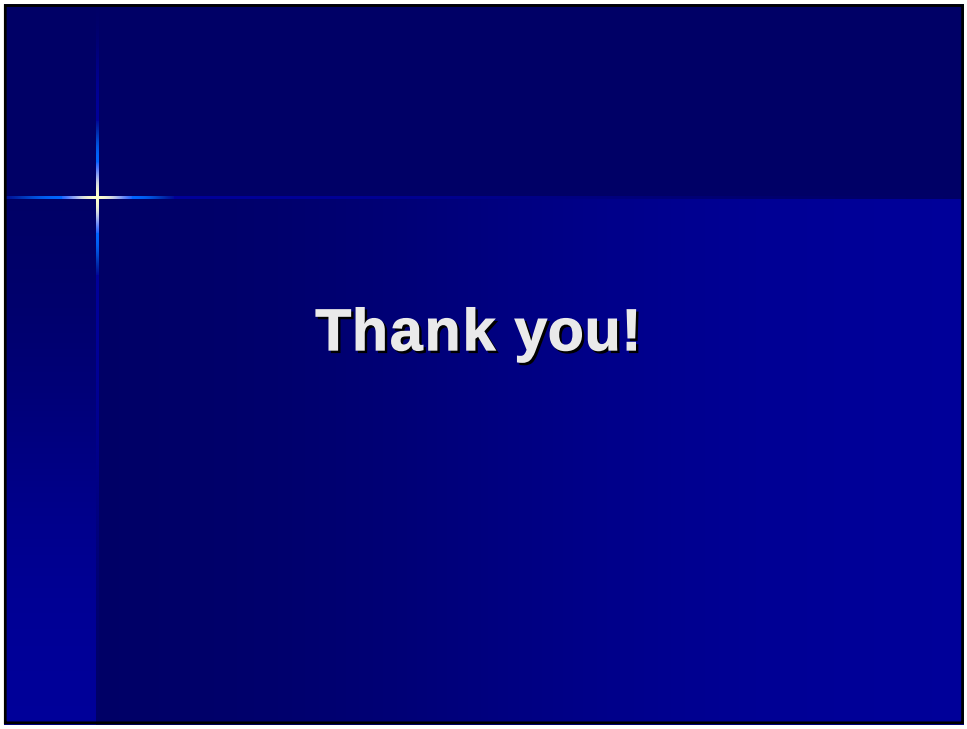
- BAFPS's accreditation of other agencies (e.g., DOST), SUCs and private laboratories in the country to improve access to analytical laboratories for pesticide residue and other tests
- Establishment of strategically located and well-equipped packinghouses that can be managed by mango growers' association or cluster of mango growers
- Hands-on training on improved production (e.g., fertilization, irrigation, pruning and bagging) and post-harvest (e.g., harvesting, sorting, hot water treatment, packaging and transportation) technologies/practices

Provision of an effective market information and market promotion in the existing and target export markets

- Timely and reliable market information on supply and demand trends, prices and quarantine requirements in existing and target markets
- Establishment of the Agriculture and Fisheries Market Information System (AFMIS) database and Web server at the national level

Provision of an effective market information and market promotion ...

- Government agencies (DA-AMAS and DTI-BETP and CITEM) support on all promotional activities (e.g. organization of trade missions, trade fairs, exhibitions, etc.)
- Assistance provided by the Philippine embassies and agricultural attaches in locating other potential markets for fresh mangoes (Lantican 2008)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