

Republic of India

**Final Report for  
Data Collection and Confirmation  
Study for Agricultural Value Chains  
in the Republic of India**

**August 2015**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
(JICA)**

**Kaihatsu Management Consulting Inc.**

ID
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## Abbreviations

ADB	Asian Development Bank
ADH	Additional Director Horticulture
ADH(2)	Assistant Director Horticulture
AEZ	Agri-Export Zones
AH&D	Department of Animal Husbandry, Dairying and Fisheries
AHO	Assistant Horticulture Officer
AIDIP	Agribusiness Infrastructure Development Investment Program
AIMLEA	All India Meat & Livestock Exporters Association
AP	Andhra Pradesh
APEDA	Agricultural & Processed Food Products Export Development Authority
APFPS	Andhra Pradesh Food Processing Society
APICOL	Agricultural Promotion and Investment Corporation of Odisha
APMC	Agricultural Produce Market Committee
AVC	Agricultural Value Chain
CA	Commission Agent
CACP	Commission for Agricultural Costs and Prices
CDB	Coconut Development Board
CHANGE	Center for Holistic Agri Food Processing and Green Enterprises
CII	Confederation of Indian Industry
CPC	Central Processing Center (Mega Food Park)
DASD	Directorate of Areca nut and Spices Development
DCCD	Directorate of Cashew nut and Cocoa Development
DFPD	Department of Food and Public Distribution
DMS	Delhi Milk Scheme
DOA	Department of Agriculture and Cooperation
DDH	Deputy Director Horticulture
ECA	Essential Commodities Act
EIC	Export Inspection Council
EIA	Export Inspection Authority
EIA (2)	End Implementing Agency
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCI	Food Corporation of India
FMCG	Fast Moving Consumer Goods

FMD	Foot-and-Mouth Disease
FPO	Farmer Producer Organization
FSSAI	Food Safety and Standards Authority of India
GAP	Good Agriculture Practices
GCMMF	Gujarat Cooperative Milk Marketing Federation
GDP	Gross Domestic Product
GSDP	Gross State Domestic Product
GOI	Government of India
HACCP	Hazard Analysis and Critical Control Points
HO	Horticulture Officer
ICAR	Indian Council of Agricultural Research
ICM	Integrated Crop Management
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IGPB	Indian Grape Processing Board
IFAB	International Flower Auction Bangalore
IFAD	International Fund for Agricultural Development
IFFCO	Indian Farmers Fertilizer Cooperative Limited
IICPT	Indian Institute of Crop Processing Technology
INM	Integrated Nutrient Management
INR	Indian Rupee
IPM	Integrated Pest Management
ISAM	Integrated Scheme for Agricultural Marketing
IT	Information Technology
ITDP	Institute for Transportation & Development Policy
IVC	Integrated Value Chain
JETRO	Japan External Trade Organization
JFPR	Japan Fund for Poverty Reduction
JICA	Japan International Cooperation Agency
KASAM	Kandhamal Apex Spices Association for Marketing
KMC	Kaihatsu Management Consulting, Inc.
MAFF	Ministry of Agriculture, Forestry and Fisheries, Japan
MFF	Multi-tranche Financing Facility
MFPS	Mega Food Parks Scheme
MIDH	Mission for Integrated Development of Horticulture
MIP	Micro Irrigation Project
MOFPI	Ministry of Food Processing Industries

MSAMB	Maharashtra State Agriculture Marketing Board
MSME	Micro, small and medium enterprise
MSP	Minimum Support Price
NABARD	National Bank for Agriculture and Rural Development
NABL	National Accreditation Board for Testing and Calibration
NAFED	National Agricultural Cooperative Marketing Federation of India Ltd.
NAP	National Agricultural Policy
NCCD	National Center for Cold Chain Development
NCDC	National Cooperative Development Corporation
NDDB	National Dairy Development Board
NDP	National Dairy Plan
NFSM	National Food Security Mission
NGO	Non-governmental organization
NHB	National Horticulture Board
NHM	National Horticulture Mission
NIAM	National Institute of Agricultural Marketing
NIFTEM	National Institute of Food Technology Entrepreneurship and Management
NLA	National Lead Agency
NMFP	National Mission on Food Processing
NMOOP	National Mission for Oilseeds and Oil Palm
NMPB	National Medicinal Plants Board
NMPPB	National Meat and Poultry Processing Board
NMSA	National Mission for Sustainable Agriculture
NREGA	National Rural Employment Guarantee Act
NSS	National Sample Survey
NSSO	National Sample Survey Office
ODA	Official Development Assistance
OFWM	On-Farm Water Management
OIE	World Organization for Animal Health
ORMAS	Odisha Rural Development and Marketing Society
OSAMB	Odisha State Agricultural Marketing Board
PDS	Public Distribution System
PFI	Poultry Federation of India
PPC	Primary Processing Center (Mega Food Park)
PPP	Public-Private Partnership
PSF	Price Stabilization Fund

RKVY	Rashtriya Krishi Vikas Yojana
RMC	Regulated Market Committee
SFAC	Small Farmers' Agri-business Consortium
SHEP	Smallholder Horticulture Empowerment and Promotion
SHG	Self-Help Group
SPS	Sanitary and Phytosanitary Standards
SWOT	Strength, Weakness, Opportunity, Threat
UAS	University of Agricultural Sciences
UT	Union Territory
VC	Value Chain
VHT	Vapor Heat Treatment
WB	World Bank

INR1 = JPY1.943

USD1 = JPY124.21

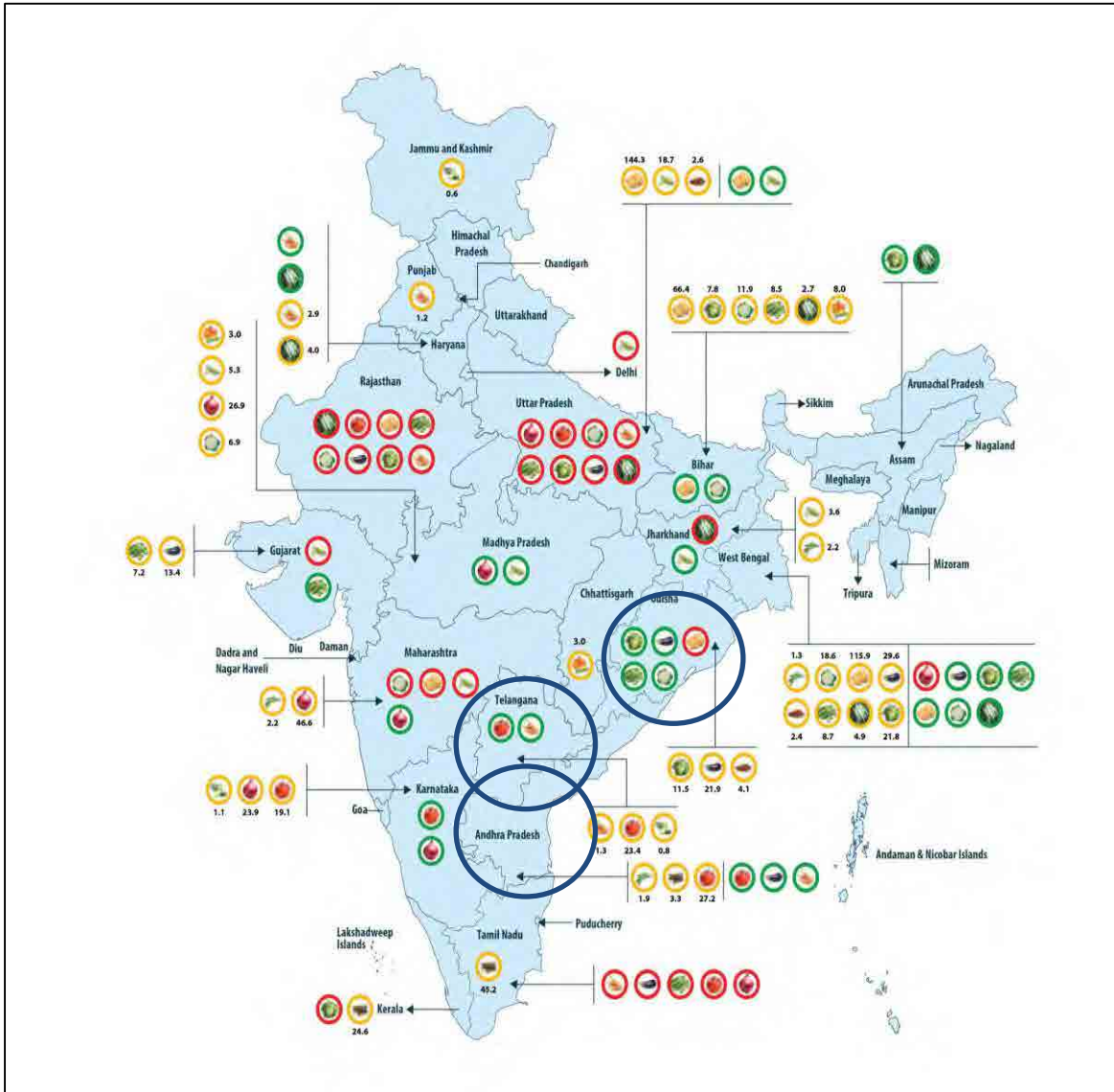
(As of August 2015)

1lakh = 100,000

1crore = 10,000,000

1hectare = 2.47acre

# Vegetable Availability Map of India<sup>1</sup>



## Commodities



The map highlights the top three surplus and deficit states for 14 major Vegetables produced in India.



The map highlights the top three production states for 15 major Vegetables which constitute over 85% of the total Vegetables produced in India.

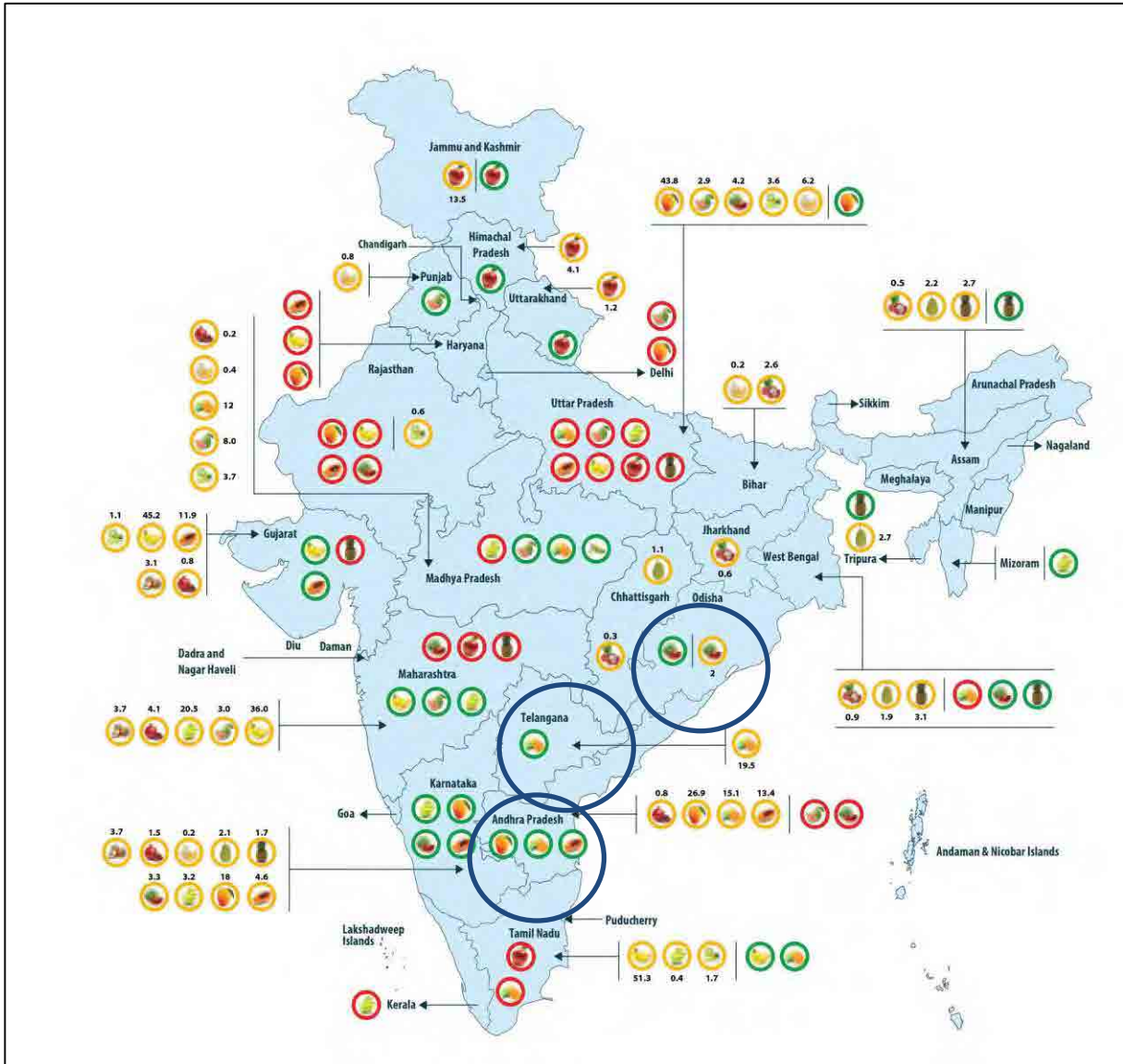
States with blue circle are the priority states.

Source: Ministry of Food Processing

([http://mofpi.nic.in/H\\_Dwld.aspx?KYEwmOL+HGqTV0f1VSVZLW3V1DC+YHsvTxu0wQ5UZV5yHmWs6HjdrQ==](http://mofpi.nic.in/H_Dwld.aspx?KYEwmOL+HGqTV0f1VSVZLW3V1DC+YHsvTxu0wQ5UZV5yHmWs6HjdrQ==))

<sup>1</sup> From left side, “Commodities“ are shown; 1) Potato, 2) Tomato, 3) Onion, 4) Brinjal, 5) Cabbage, 6) Cauliflower, 7) Okra, 8) Peas, 9) Radish, 10) Tapioca, 11) Carrot, 12) Radish, 13) Sweet Potato, 14) Beans, 15) Pumpkin / Gourd

## Fruit Availability Map of India<sup>2</sup>



### Commodities



The map highlights the top three surplus and deficit states for 14 major Fruits produced in India.



The map highlights the top three production states for 15 major Fruits, which constitute over 90% of the total Fruits produced in India.

States with blue circle are the priority states.

Source: Ministry of Food Processing

([http://mofpi.nic.in/H\\_Dwld.aspx?KYEwmOL+HGqTV0f1VSVZLW3VIDC+YHsvTxu0wQ5UZV5yHmWs6HjdrQ==](http://mofpi.nic.in/H_Dwld.aspx?KYEwmOL+HGqTV0f1VSVZLW3VIDC+YHsvTxu0wQ5UZV5yHmWs6HjdrQ==))

<sup>2</sup> From left side, “Commodities“ are shown; 1) Banana, 2) Mango, 3) Citrus fruit, 4) Papaya, 5) Guava, 6) Grapes, 7) Apple, 8) Water melon, 9) Pineapple, 10) Musk melon, 11) Pomegranate, 12) Jackfruit, 13) Litchi, 14) Aonla, 15) Spota

## Introduction

This Study, entitled “Data Collection and Confirmation Study for Agricultural Value Chains in India” (hereinafter “the Study”), was carried out by the Japan International Cooperation Agency (JICA).

This Final Report presents the outcomes of the Study after conducting three field surveys in India including government policy and regulations, the current status of and bottlenecks in agricultural value chains, private companies, and outcomes of detailed value chain survey in the three priority states. The report also proposes the direction of future JICA assistance based on the outcomes.

The Study was conducted by a Study Team organized by Kaihatsu Management Consulting Inc., (KMC) under a contract with JICA. The Study Team’s key contacts are as follows.

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The field study was conducted in supported with a local partner of KMC, Center for Holistic Agri-Food Processing & Green Enterprise(CHANGE) based in Bangalore, Karnataka.

# 1. Outline of the Study

## 1.1 Objective of the Study

The objective of the Study is to collect and verify basic information on agricultural value chains<sup>3</sup> (AVCs) in India, including food processing, distribution and marketing of farm produce, in order to assist the stable supply of farm crops and food products and to increase income for farmers and stakeholders in related industries. The Study will examine and make recommendations for future cooperation policy of JICA in this area. The Study was conducted through a review of existing material on processing, distribution and marketing of farm crops, site visits and interviews with stakeholders.

The target outcomes of the Study are:

- 1) Clarification of the current situation of processing, distribution and marketing of farm crops in India, and their bottlenecks.
- 2) Proposals for the direction of future assistance by JICA after clarification of the roles and activities of both the government and private sector in processing, distribution and sale of farm crops.

## 1.2 Study Area

In its first phase the Study covers the entire country in order to gain an overview of AVCs in India. Based on the study and analysis in the first phase, Andhra Pradesh (AP), Telangana and Odisha were selected as priority states; their related policies and value chain systems was examined in more detail in the second phase of the Study. Additional survey was conducted for AP in the third phase.

## 1.3. Background of the Study

### 1.3.1 Changing need for assistance in the agriculture sector in India

#### (1) Structural transformation of the agriculture sector in India

Agriculture is one of the most critical sectors of the Indian economy. The growth and development of agriculture and allied sectors directly affects the well-being of people in general, rural prosperity and employment. Agriculture forms an important resource base for a number of agro-based industries and agro-services, and continues to be the mainstay of life for the majority of the Indian population. The agricultural sector in India has undergone a significant change: its share of Gross Domestic Product (GDP) has decreased

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<sup>3</sup> Although there is no universally accepted definition of the term, the Study employs a definition used by World Bank that the full range of value adding activities required to bring a product or service through the different phases of production, including procurement of raw materials and other inputs. Webber, C. M., and P. Labaste (2010). "Building competitiveness in Africa's agriculture: A guide to value chain concepts and applications." World Bank.

from 30 percent in 1990/91 to 13.9 percent in 2013/14<sup>4</sup>, indicating a shift from a traditional agrarian economy towards a service-dominated one. However this decrease in the contribution of agriculture to GDP has not been accompanied by a matching reduction in the share of agriculture in employment. About 52 percent of the total workforce is still employed in the farm sector, which makes more than half the Indian population dependent on agriculture for sustenance.<sup>5</sup> About 80 percent of these people are engaged in small-scale agriculture, having a landholding of less than two hectare, thus increasing their income has great importance for poverty reduction in India. In the midst of unprecedented economic growth, the gap between the rich and the poor, and urban and rural areas, has expanded and the frustration of the underprivileged population has soared. Special consideration for supporting small-scale farmers, therefore, would contribute to the stability of the whole of Indian society.

Reflecting the growth of the urban population, changes in eating habits due to an increase in the middle-class population, and a growing emphasis on “healthy diets”, the demand for horticultural crops like vegetables, fruit and dairy products has been rapidly increasing. Horticultural crops and dairy products have great potential to contribute to increasing farmers’ income. Since diversification of farmers’ sources of income through creating opportunities for non-farming income is crucial for upgrading livelihoods, value addition in agriculture holds huge potential for enhancing the living standard of the majority of people. Improved agricultural marketing offers a major opportunity to achieve this objective.

## **(2) Related policy of the Indian government**

Reflecting the current trend for diversifying demand for agricultural products due to changes in the consumption patterns of the middle class, the Indian government focused on regulatory reform of agriproduct distribution and promotion of the food processing industry in its *Twelfth Five Year Plan 2012-2017*. The Plan aims to remove unnecessary regulations and thereby increase the choice available to farmers for marketing agro products. It also targets increasing farmers’ income, reduction of post-harvest loss, diversification of cultivation patterns, generation of employment, and increasing exports through establishing primary processing facilities in farming areas and connecting them to food processing industries. These targets aim to improve the livelihood of small-scale farmers by organizing farmers groups and strengthening the linkages between farmers and markets.

### **1.3.2 Global Food Value Chain Strategy of the Japanese Government**

Given ongoing expansion of the global food market, the Government of Japan announced its *Strategy for the Global Food Value Chain* in June 2014. This targeted: a) business expansion of the Japanese food industry and its growth overseas; b) export of food-related infrastructure and establishing an amicable environment for Japanese food exports; and c) economic development of developing countries through Official Development Assistance (ODA). The strategy aims to promote the establishment of food value chains from agricultural

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<sup>4</sup> *State of Indian Agriculture 2011-12*, Ministry of Agriculture, *Economic Survey 2013-14*, Ministry of Finance

<sup>5</sup> *National Sample Survey (NSS) 66th Round (July 2009-June 2010)*, National Sample Survey Office.

production, processing and distribution, to consumption, under effective public-private partnerships between government, academia and the private sector that utilize the strengths of Japan.<sup>6</sup>

The strategy proposes that ODA in the agriculture and food sector should focus on areas where the Japanese food industry has a comparative advantage, and where collaboration with businesses or investments of Japanese private companies overseas is possible. Japan also has advanced cold chain and storage facility technologies, which are very much needed in India. Consideration should be given to matching the need for private investment in India and the interest of Japanese companies.

**1.4 Study Implementation Plan**

**1.4.1 Workflow**

The workflow of the Study implementation is shown below.



Source: Study team

Figure 1-1: Workflow

The Study started in early October 2014. The Study team visited India for three times. The team studied the whole India for the first visit, three priority states that are AP, Telangana and Odisha for the second visit and AP for the third visit. The team submits the final report in August 2015.

<sup>6</sup> Announcement by the Ministry of Agriculture, Forestry and Fisheries (MAFF) Japan, 6<sup>th</sup> June 2014 ([http://www.maff.go.jp/j/kokusai/kokkyo/food\\_value\\_chain/about.html](http://www.maff.go.jp/j/kokusai/kokkyo/food_value_chain/about.html))

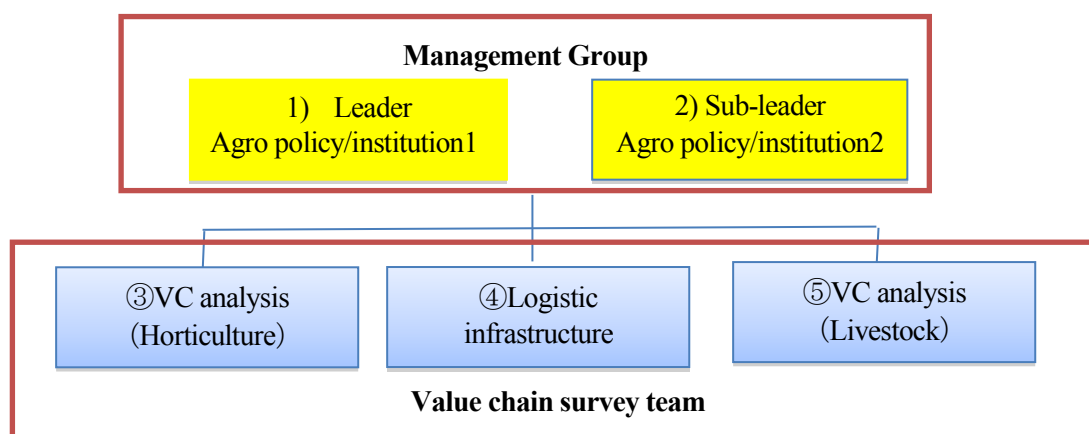
### 1.4.2 Study Team

The Study team consists of the following five members:

Table 1-1 Study team

Name	Area of responsibility
MAMIYA Chiyo	Team Leader/Policy and institution1
HONDA Yoshiko	Sub-leader/Policy and institution2
IKEDA Yukio	Value chain analysis (Horticulture)
WATANABE Yoshiteru	Logistics infrastructure analysis
IKEGAYA Fumiko	Value chain analysis (Livestock)

Source: Study Team



Source: Study Team

Figure 1-2 Study implementation structure

The Study team was supported by Indian partner. Center for Holistic Agri Food Processing and Green Enterprises (CHANGE) was selected as an Indian partner for the Study. They supported preparatory survey for the first field survey, conducted detailed value chain survey for the selected crops in the priority states and provided logistic and professional support to the field surveys by the Study team.

### 1.4.3 Methodology

#### (1) Literature review

Extensive literature review was conducted in Japan before the first filed survey as well as throughout the study period. Literatures include papers, reports books both in Japanese and English, government documents and statistics. Documents provided at the filed level were also examined.

#### (2) Field survey

Three field surveys were conducted during the Study. Their overview was given below:

Table 1-2 Overview of field survey

	First survey	Second survey	Third survey
Period	From 26 October to 22 November 2014	From 1 to 28 March 2015	From 7 June to 2 July 2015
States visited	Karnataka, Maharashtra, AP, Gujarat, Kerala, Himachal Pradesh, Delhi	AP, Telangana, Odisha, Delhi	AP
Methodology	<ul style="list-style-type: none"> <li>➤ Interview with government organizations, private companies/institutions, donors, farmers and other stakeholders</li> <li>➤ Site visits (farm, market and factory)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Interview with government organizations, private companies/institutions, farmers and other stakeholders</li> <li>➤ Site visits (farm, market and factory)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Interview with government organizations, private companies/institutions, farmers and other stakeholders</li> <li>➤ Site visits (farm, market and factory)</li> <li>➤ Stakeholder workshops</li> </ul>

Source: Study Team

As shown above, survey activities consist of interviewing farmers, government organizations, donors and private companies, and site visits such as farm, factory or market. The places visited in the two field surveys are listed below:

Table 1-3: Places and organizations visited in the filed survey

State	Category of visit	Places to visit
First survey		
Delhi	Government organizations	Department of Agriculture and Cooperation, Small Farmers' Agribusiness Consortium (SFAC), Department of Animal Husbandry, National Horticulture Mission (NHM), Agricultural and Processed Food Products Export Development Authority (APEDA), National Center for Cold Chain Development (NCCD), National Horticulture Board (NHB), Ministry of Food Processing and Industry (MOFPI)
	Private companies/institution	Poultry Federation, Sojitsu, Itochu, Marubeni
	Donor	Japan External Trade Organization (JETRO), World Bank (WB), Asian Development Bank (ADB)
	Site visit	Factory visit of Mother Dairy, Hind Agro Industries, traditional milk retail shop, outlet of Mother Dairy, traditional retail shops (milk, poultry, meat), wholesale market of poultry and livestock, wholesale market of fruits and vegetables
Karnataka	Government organizations	Indian Institute of Horticultural Research, Karnataka State Agricultural Produce Processing and Export Corporation, Department of Horticulture
	Private companies/institution	Metro
	Farmers	Registered famers of Safal
	Site visit	Srini Food Park, International Flower Auction Bangalore, Yalahanka Farmers Market, Karuturi, Bangalore City Market, Vegetable Wholesale Markets, Safal factory and auction center of vegetables, HOPCOM shop, cold storage of Snowman, India Food Park
AP	Government organizations	Department of Livestock and Fisheries, Department of Horticulture, Department of Agriculture, National Institute of Rural Development, Department of Industry and Commerce, International Crops Research Institute for the Semi-arid Tropics
	Private companies/institution	Rural Technology Park
	Site visit	Gaddiannaram Fruits Wholesale Market, Gubba Cold Storage, Sam Agritech, milk collecting center
Maharashtra	Government organizations	Maharashtra State Agriculture Marketing Board (MSAMB)
	Private companies/institution	All India Meat and Livestock Exporters Association, Kagome, Marubeni, Sumitomo
	Site visit	Wholesale market in Mumbai, Allana group, Bashi Market
Kerala	Government organizations	Department of Agriculture
	Private companies/institution	Center for Development studies, Manjillas Group
	Site visit	Rubber farmer, Farmers' market, World market
Himachal Pradesh	Government organizations	Department of Agriculture, Agricultural Produce Market Committee (APMC), Horticulture Produce Marketing and Processing Corporation

State	Category of visit	Places to visit
Himachal Pradesh	Donor	JICA project
	Site visit	APMC market, Farm visits
Gujarat	Government organizations	NDDB, Department of Animal Husbandry, Department of Horticulture, Gujarat Agro Industries Corporation
	Site visit	Amul (Kaira District Cooperative Milk Producers' Union)
Second survey		
AP	Government organizations	Planning Department, Department of Horticulture, Department of Agriculture, Food Processing Society, National Bank for Agriculture and Rural Development (NABARD), Spice Board, Dr. Y.S.R. Horticulture University
	Private companies/institution	Confederation of Indian Industry (CII)-AP chapter, Capricorn Food Products India, Jain Irrigation System, Navya Foods, Synthite Industries, ITC, Srini Food Park, NRI Agritech Pvt. Ltd.
	Site visit	Farm, market and factory visits in Madanapalle, Chittoor, Guntur
Telangana	Government organizations	Department of Horticulture, Food Processing Society, National Institute of Agricultural Extension Management (MANAGE)
	Private companies/institution	Ushodaya Enterprises (Priya), K.S. Cold Storage, Cold Space Agrotech India
	Site visit	Farm, market and factory visits in Nizamabad, Adilabad, Rangareddy and Mahbubnagar
Odisha	Government organizations	Department of Agriculture, Department of Water Resources, Directorate of Horticulture, Department of Micro, Small and Medium Enterprises, Agricultural Promotion and Investment Corporation of Odisha, Regulated Market Committee
	Private companies/institution	KASAM, SS Foods, Rajaya Lakshmi Cashews
	Site visit	Farm, market, and traders visit in Pulbani, Rayagada, Koraput and Bhubaneswar
Karnataka	Private company	Beloorbayir Biotech (Bayir)
	Site visit	Retail shop and market visit in Bangalore
Third survey		
Maharashtra	Government organization	MSMAB, APEDA
	Private companies	Mahagrape, KayBee Export, Amar, Marubeni, Mitsui,
	Site visit	Integrated pack house, farmers market
Karnataka	Government organization	APEDA, Indian Institute of Horticulture Research
	Private companies/institution	Global Green, Indian Gherkin Exporters Association, Reliance
	Site visit	Gherkin farm, high end market
AP	Government organization	Horticulture Department, Marketing Department, APEDA, Industries and Commerce Department, NABARD
	Private companies/institutions	ITC, Amruth banana ripening industry, Sree Sreenivasa Fruits Processing Industry, individual mango exporters, Srini food park, Navya Food Private Limited, Global Green

State	Category of visit	Places to visit
AP	Site visit	Producers companies, Integrate pack house, Mango farms, Mango markets, Tomato markets, Retail markets, farmers market,

Source: Study Team

Although the focus in the third filed survey was AP, Maharashtra and Karnataka were visited to study some of the successful AVC cases.

### **(3) Comparative study between India and Japan**

The government system dealing with AVC was studied and compared between Japan and India. The focus was placed on how the government supports food processing and agricultural marketing. The Study team interviewed Food Industry Affairs Bureau, MAFF in Japan as well as Department of Agriculture, Forestry and Fishery, Chiba Prefecture to understand the policy and mechanism of government at both central and prefectural level to promote food processing and support marketing of agricultural produce. The Study team also studied various government schemes to support AVC in Japan including price stabilization, support for contract farming and facilitating linkage between farmers and processors. The analysis of comparison was presented at the stakeholder workshops during the third field survey and utilized for formulating a proposal.

### **(4) Stakeholder workshop**

Stakeholder workshops were held twice during the third filed survey in AP. One is for chili on 18 June 2015 in Guntur and the other is for mango and tomato on 24 June 2016 in Chittoor. The purpose of the workshop was to confirm and build a consensus on the current situation and bottlenecks of VC of the priority crops in AP, share the needs of assistance for different stakeholders and discuss how the stakeholders can collaborate to solve the bottlenecks. The workshop was an occasion for Study team to understand how the respective stakeholders respond to the opinions from other stakeholders and identify the areas where all the stakeholders can agree.

In order to facilitate active discussion among different stakeholders, the Study team adopted ‘World Café’ methodology which facilitates effective and in-depth dialogue among large number of people<sup>7</sup>. The workshops were organized by Horticulture department of AP government and attended by representatives of Horticulture Department, Agricultural Marketing Department and related government institutions such as Spice Board, NABARD, APEDA, farmer’s representative, processor’s representative- both small scale and medium and large scale, representatives of traders and exporters. Presentation and outcomes of the workshops are given in ANNEX6.

<sup>7</sup> For more details about the methodology, please see the following link. (<http://www.theworldcafe.com/key-concepts-resources/world-cafe-method/>)

## **(5) Limitations of the Study**

- The survey does not cover all the states and thus has limitations in terms of geographical comprehensiveness of the findings.
- The survey mainly covers post-harvest to distributions and excludes production. Needs identified at production level were not studied in detail due to the framework of the Study. These needs should be studied in details when designing the actual assistance.
- There is a difference in term of depth of study among three states subject for detailed VC study. As the Study team conducted the exclusive field survey in AP during the third phase, outcomes and proposal for AP is more in-depth and comprehensive compared to those for other two states, namely Telangana and Odisha.
- The purpose of Study is to propose the direction of assistance. Although the Study team made a proposal for required inputs for pilot projects in AP, they should be considered as preliminary suggestions. The appropriateness and feasibility of proposal should be examined when the actual assistance is designed.

## 2. Government Policy and Regulations

### 2.1 Governmental policy

#### 2.1.1 Evolution of agricultural policy

Since independence, India's main policy goal for the agriculture sector has been to attain food self-sufficiency. In order to achieve the goal in staple foods – rice and wheat – the Indian policies initially focused on expanding the cultivated area, land reform, community development and restructuring rural credit institutions. Trade was strictly regulated through both quota restrictions and high tariff rates. During the 1960s and 1970s, there was widespread adoption of high yielding varieties of rice and wheat. At the same time, India expanded the irrigated area, promoted increased use of chemical fertilizers and pesticides, and improved access to institutional credit. Together, these initiatives led to dramatic leaps in agricultural production and made India self-sufficient in food grain production at the national level. In the 1980s Indian agriculture policy shifted to evolution of a production pattern in line with the demand pattern, leading to a shift in emphasis to other agricultural commodities like oilseed, fruit and vegetables. Farmers began adopting improved methods and technologies in dairy, fisheries and livestock, and meeting the diversified food needs of India's growing population. The government has pursued other policy goals to ensure adequate prices to farmers, and to maintain stable prices for consumers. The main policy instruments introduced by the government to meet these goals are as follows.

- Minimum Support Price (MSP):

This is a form of market intervention by the government to insure agricultural producers against any sharp fall in farm prices. It is announced on the basis of recommendations from the Commission for Agricultural Costs and Prices (CACP), based on the cost of production. If the market price for a commodity falls below the announced minimum price due to bumper production and a glut in the market, government agencies purchase the entire quantity offered by farmers at the announced MSP. MSP benefits have been capitalized into the value of land and fixed assets, contributing to higher production costs and pressure to raise MSPs every few years. As a result India's food grain MSPs are less reflective of actual market conditions.

As shown in the below table, it covers only food grains. Since it does not include any horticulture crops, farmers who cultivate horticulture crops are suffering from very acute price fluctuation without any government compensation scheme.

Table 2-1: Minimum Support Price (INR per 100kg)

Commodity	2013-13	3014-15	increase
Paddy	1,310	1,360	50
Jowar (Sorghum)	1,500	1,530	30
Bajra (Peal Millet)	1,250	1,250	0
Maize	1,310	1,310	0
Ragi (finger Millet)	1,500	1,550	50
Arhar (dal)	4,300	4,350	50
Moong (dal)	4,500	4,600	100
Urad (dal)	4,300	4,350	50
Cotton	3,700	3,750	50
Groundnut	4,000	4,000	0
Sunflower seed	3,700	3,750	50
Soya bean	2,500	2,500	0
Sesame	4,500	4,600	100
Nigerseed	3,500	3,600	100
Wheat	1,400	1,450	50
Barley	1,100	1,150	50
Gram	3,100	3,175	75
Lentil	2,950	3,075	125
Mustard	3,050	3,100	50
Safflower	3,000	3,050	50
Toria (oilseed)	3,020	3,020	0
Copra (palmoil)	5,250	5,250	0
Coconut	1,425	1,425	0
Jute	2,400	2,400	0
Sugarcane	210	220	10

Source: Directorate of Economics and Statistics

In March 2015, the government announced to set up of a Price Stabilization Fund (PSF) of INR 5 billion to be used to support market interventions for managing prices of perishable horticultural commodities. The PSF will be used to advance interest-free loans to the state governments and central agencies to support their working capital and other expenses on procurement and distribution interventions for such commodities. To begin with it will be used for onion and potato. SFAC will act as Fund Manager. The government has a plan to expand the coverage of the fund to other horticulture commodities, but if this initiative is effective for farmers to get correct price is unknown yet as it just started.

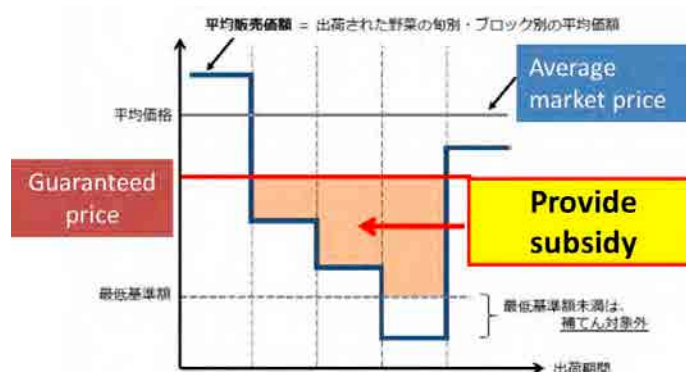
## Column: Ensuring stable food supply and compensating farmers for price fall – a Case in Japan

### 1. Background

- Unstable supply of major vegetable in 1960's and 70's in Japan
- Unstable price affected heavily to farmers' life.

### 2. What does MAFF do?

- Designate major crops, production areas and markets
- Develop demand/supply plan for designated crops every year.
- Develop a special fund to provide subsidy to farmers at the time of price drop.



### 3. Assessment of the scheme

The original scheme started in 1966. The scheme has been improved and upgraded since then. Although the farmers initially have to contribute some percentage of funds, the money will be saved and utilized for refunds so that the farmers do not need to pay every year. The scheme has been utilized by wide range of farmers. The scheme has contributed to stabilizing the supply of major vegetable, to stabilizing the incomes of farmers and ultimately to stabilizing the price of vegetables.

### ● Subsidies for food and inputs for producers:

The Food Corporation of India (FCI) purchases food grain from farmers at the MSP and sells at subsidized prices through the public distribution system (PDS) to protect low-income consumers. The government also provides input subsidies for fertilizer, electricity, fuel and irrigation. India's input subsidies have been greatly increased in the past few decades, and have begun to strain the government budget.

### ● Agriculture trade policy:

India is a marginal player in the global agri-food trade. Until the 1990s, agricultural trade was strictly regulated with high tariffs and quantitative restrictions and was channeled through public trading agencies. India's agricultural export policies have been liberalized in part since 1994. Reforms have included a reduction in products subject to state trading, relaxation of export quotas, and removal of minimum export prices.

- Market regulations:

India's domestic agricultural markets remain subject to a complex regulatory framework. The Essential Commodities Act (ECA), for example, allows central and state governments to place restrictions on the storage and movement of commodities deemed essential by governments. Also, the APMC Act requires that farm produce be sold only at regulated markets through registered intermediaries (details of the APMC Act are given in 2.1.2). Until recently food processing industries were limited by regulation to small-scale operations. In spite of moves to deregulate, small-scale low-technology firms established under the old laws still dominate the industry. Government-related firms have been favored in transportation, marketing and distribution of agri-food commodities.

### **2.1.2 Recent policy developments**

In July 2000, the first-ever *National Agriculture Policy* (NAP) was announced, which aims to attain an annual growth rate of 4 percent in the agriculture sector between 2000 and 2020. The NAP seeks to: realize the vast untapped growth potential of Indian agriculture; strengthen rural infrastructure to support faster agricultural development; promote value addition; accelerate the growth of agribusiness; create employment in rural areas; secure a fair standard of living for farmers, agricultural workers and their families; discourage migration to urban areas; and face the challenges arising out of economic liberalization and globalization. Since the announcement of the NAP, however, little concrete action has been taken at the central and state levels to implement the proposed policy measures.

In the *Eleventh Five Year Plan* which started in 2007, though, several epochal steps were taken:

- Revising the APMC Act to relax regulations and to allow contract farming
- Removing the reservations for small-size firms in food processing industries
- Removing restrictions on future trading on many commodities
- Allowing up to 100 percent foreign ownership in many agribusiness sectors.

Following up on the above steps, the *Twelfth Five Year Plan 2012-2017* has further facilitated and focused on the above reforms, reflecting the increasing demand for allowing farmers to market agriproducts by removing unnecessary regulations. The government started to promote the development of logistics infrastructure that had not been done sufficiently. Development of market, storage and cooling facilities across the country, and nurturing the food processing industry, requires large-scale investment,<sup>8</sup> leaving the

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<sup>8</sup> Kumar & Prasad insist that the food processing industry requires USD28 billion. JETRO (2014) also indicates that the required capacity of cold chain facilities for wholefood products in the country is more than 61 million tonnes, meaning there has to be more than INR550 billion investment by 2015/16.

government little choice but to invite private investment. Although the *Eleventh Five Year Plan* promotes farm crop distribution under public-private partnership schemes, participation by the private sector was limited due to unclear roles and responsibilities of concerned organizations and operational procedures. On the other hand, the *Twelfth Five Year Plan* discusses various schemes to boost private investment, such as releasing public funds to unprofitable sectors or providing subsidies.

The Plan highlights the importance of post-harvest management reform and promotion of the food processing industry for development of the agriculture sector. The targets and measures related to AVCs under the *Twelfth Five Year Plan* are summarized in the table below.

Table 2-2: Target and measures for agricultural value chains

Category	Target	Measures
Reform of post-production management of agriproducts	<ul style="list-style-type: none"> <li>- Develop efficient and competitive agri-markets</li> <li>- Decrease post-harvest losses</li> <li>- Promote private investment</li> </ul>	<ul style="list-style-type: none"> <li>- Reform of APMC Acts/Rules</li> <li>- Develop traceability, quality assurance systems</li> <li>- Develop logistics infrastructure</li> <li>- Develop cold storage, cold chains</li> </ul>
Promotion of food processing industry	<ul style="list-style-type: none"> <li>- Increase percentage of food processing from 6% to 20%</li> <li>- Increase level of value addition from 20% to 34%</li> </ul>	<ul style="list-style-type: none"> <li>- Promote mega food parks</li> <li>- Develop integrated cold chain facility</li> <li>- Develop primary processing facilities, distribution depots in rural areas</li> <li>- Modernize food processing industry</li> </ul>

Source: *Twelfth Five Year Plan*

Of these measures, the reforms listed below have special importance for understanding the current situation of AVC in India.

### **(1) Reform of APMC Act**

Recognizing problems like low prices received by farmers, higher marketing costs and considerable post-harvest losses in agricultural produce in the entire value chain, most state governments introduced several mandatory regulations during the 1960s and 1970s. One of the important regulatory initiatives that was taken up for regulating the marketing practices in primary wholesale markets was the “Agricultural Produce Marketing Committee Act” (APMC Act). The regulatory provisions were to be enforced by APMCs, established under the respective state APMC Acts.

Over a period of time the markets have, however, become restrictive and monopolistic, providing no help in direct and free marketing, organized retailing, smooth raw material supply to agro-processing, competitive trading, information exchange or adoption of innovative marketing systems and technologies. Farmers cannot sell their products directly in bulk outside of the APMC markets, only on a retail basis to consumers. Farmers have to bring their products to the market yard. Exporters, processors and retail chain

operators cannot get the desired quality or quantity of produce for their business due to restrictions on direct marketing. The processor cannot buy produce at the processing plant or at the warehouse. There is thus an enormous increase in the cost of marketing, and farmers end up getting a low price for their products. Under the APMC Act, until recently only state governments were permitted to set up markets. Monopolistic practices and modalities of state-controlled markets have prevented private investment in the sector.

The Government of India, aiming to promote private participation in the agricultural sector, has suggested reform of the Acts to state governments to enable private players to participate as buyers and to purchase directly from farmers. This reform has facilitated the acceptance and growth of contract farming by a number of international and domestic firms. Though various states/union territories (UTs) have taken initiatives to reform their existing APMC Acts the pace of reform has been slow and uneven, resulting in a lukewarm response from the private sector for investing in the development of marketing infrastructure. In order to pursue and expedite the pace of reform in the country, the Ministry of Agriculture set up a committee of state agricultural marketing ministers under the chairmanship of the Minister of Parliamentary Affairs. The status of the reform in each state is summarized in the Table 2.2.

Table 2-3: Stages of APMC reform by state

Stage of reform	States and Union Territories
Complete implementation of suggested reforms	AP, Arunachal Pradesh, Chandigarh, Chhattisgarh, Himachal Pradesh, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Punjab, Rajasthan, Sikkim
Partial implementation of suggested reforms	Delhi, Gujarat, Haryana, Karnataka, Uttar Pradesh
An existing act which already incorporates suggested reforms	Tamil Nadu
No existing act and no reforms implemented	Andaman & Nicobar Islands, Bihar, Dadra & Nagar Haveli, Daman & Diu, Kerala, Lakshwadeep, Manipur. (Bihar has abolished the APMC Act, hence facilitating direct sourcing by private companies)
The process of implementation of suggested reforms initiated but has to be completed	Assam, Goa, Jammu & Kashmir, Jharkhand, Meghalaya, Mizoram, Pondicherry, Tripura, Uttaranchal and West Bengal

Source: *Flavours of Incredible India*, Ernst and Young

Generally, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, and Maharashtra are considered to be successful cases for APMC reforms, where reforms prompted the entry of the private sector into the food distribution business. Interestingly, however, the case of Bihar, where the APMC Act was totally scrapped, is considered to be a case of failure of the reform, as the abolition of the APMC Act did not bring about any revitalization of food trading business in the state.

The detailed area-wise status of progress of the reform can be referred to in ANNEX 2.

## **(2) Development of Food Safety and Standards**

The Food Safety and Standards Authority of India (FSSAI) is a statutory regulatory body under the Ministry of Health and Family Welfare, Government of India, and was constituted on 5<sup>th</sup> September 2008. The Food Safety and Standards Act, 2006 along with the rules and regulations are applicable from August 2011, and are mandatory for all food operators. Before the FSSAI and the rules and regulations brought about by it, the food sector including food industries had to adhere to several laws and legislations. All those laws have been repealed and now brought under the FSSAI, which is a unified law. The FSSAI Act, rules and regulations in place now broadly cover the following:

- General provisions as to articles of food
- Enforcement of the Act
- Offences and penalties
- Adjudication and food safety appellate tribunal
- Licensing and Regulations of food businesses
- General hygiene and sanitary practices to be followed by food business operators
- Food product standards and food additives (food additives permissible and their limits)
- Packaging and labeling regulations
- Contaminants, toxins and residues (permissible limits in various foods)
- Notified laboratories and procedures for sampling
- Prohibition and restriction on sales
- Various aspects dealing with the functioning of the FSSAI.

The FSSAI Act is applicable to all food businesses involved in the manufacturing, storing and distribution of food or ingredients of food. It is applicable to restaurants, caterers and also street vendors; to small, medium and large operators. It is also applicable to importers and exporters of food. However the provisions of the FSSAI Act do not apply to any farmer, fisherman or farming operation of crops, livestock or aquaculture, or supplies used or produced in farming, or products of crops produced by a farmer at farm level or a fisherman in his operations.

In these circumstances, an international food certification system such as Hazard Analysis and Critical Control Points (HACCP) or GLOBALGAP is considered to ensure food safety. The extent to which the certification system is used is described below:

- Almost all export-oriented units adopt one or more of the food safety certifications such as ISO 22000, HACCP, FSSC, GFS, IFS, GLOBALGAP, EUROGAP, SQF, BRC, depending on the buyer and the requirements of the country to which the products are being exported.
- Most of the food processing companies with a state/national brand and distribution that serve the domestic market have one of the food safety management systems, and many of them are ISO 22000 or HACCP certified.
- Smaller units who are suppliers/contract processors/packers to the bigger companies also have food safety systems in place that are audited by either the bigger companies or their representatives.
- The very small and unorganized food processing industries that serve small markets most likely do not have any certified food safety management system in place.
- There are several international and national certification agencies that undertake audit and certification of plant and systems.
- For products that are covered by FSSAI and have standards, it is not mandatory to have any certification. Certification is the industry's choice based on the buyer's requirements. But they do need to follow food safety management systems. However there are certain products, such as bottled water and infant foods, where mandatory certification from the Bureau of Indian Standards is required.
- Any products which do not have standards in the FSSAI, and ones which are new and innovative and use ingredients and additives outside of the ones listed by FSSAI, are required to get product approval from FSSAI before starting to market the product.

According to the FSSAI notification, there are 82 food testing laboratories accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) under the Department of Science and Technology. The northern region has the highest number of 28 labs, while the western region has 25, southern region has 24, and eastern region has only 5. Most of them are owned and run by the private sector. Despite the growing demands for assisting the industries to enhance the quality and reliability of Indian goods for both the domestic and export market, the number of the accredited laboratories is seriously in short. Also, many experts point out that lack of human resources and lack of proper equipment to perform test the microbes, pesticides or metals are influencing deterioration of testing quality.

**Column: Dispute on safety of Nestlé instant noodles**

‘Maggi’ instant noodles sold by Nestle are very popular brand having 90 percent share in Indian market. In June 2015, it was reported that lab tests had found unexpectedly high level of Monosodium Glutamine and 17 times the permissible limit of lead in Maggi noodles, and FSSAI ordered country-wide withdraw and recall of all Maggi products, suggesting them unsafe and hazardous for human consumption.

Nestle still claims that its noodles are safe to eat and complying with the ordinance. The company is fighting claims in a high court, citing ‘interpretation’ problem with the nation’s current food safety regulations. But the company immediately withdrew and destroyed thousands of tonnes of its noodles worth more than INR 3.2 billion. The dispute is still continuing and the company is challenging the high court order (as of July 2015), an eye opener of general public for reality of poor food safety system in the country.



Photo: Study Team

**Column: Awareness campaign on hazard of calcium carbide**

For artificially ripening a certain kind of fruits (mango, banana, guava etc.), calcium carbide has been used commonly for long time in India, as it is low cost and changes color vividly and equally. Currently, the use of calcium carbide is strictly banned as per Prevention of Food Adulteration Act because it contains the traces of arsenic and phosphorus which poses a serious threat to human health. Despite the regulation, there is almost no enforcement in practice due to lack of capacity of concerned authority and low awareness of people. FSSAI is in charge of conducting the awareness raising campaign by putting advertisement on newspapers etc., but the effect is still limited.



Advertisement on newspaper

For exporting food, quality control and inspection are conducted by the Export Inspection Council (EIC) under the Ministry of Commerce and Industry. EIC was set up by the government under the Export (Quality Control and Inspection) Act 1963, in order to ensure sound development of export trade of India through quality control and inspection. EIC is an advisory body to the government, which is empowered under the Act to:

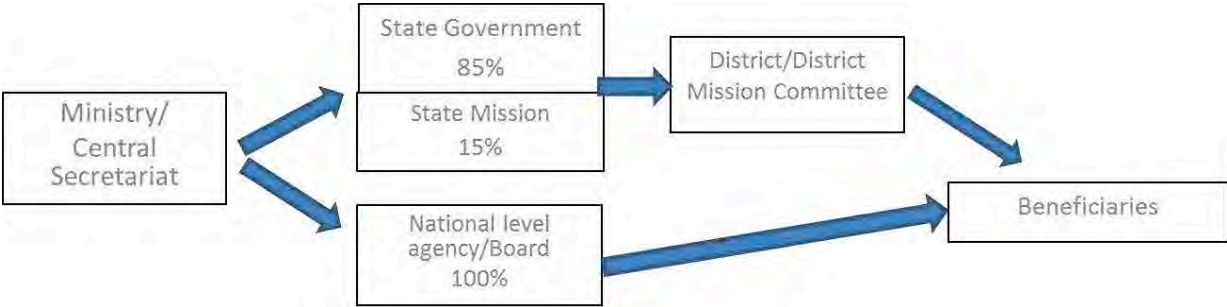
- Notify commodities which will be subject to quality control and/ or inspection prior to export,
- Establish standards of quality for such notified commodities, and
- Specify the type of quality control and / or inspection to be applied to such commodities.

Besides its advisory role, the EIC also exercises technical and administrative control over the five Export Inspection Agencies (EIA) implementing the various measures and policies formulated by EIC. EIA has five head offices at Chennai, Delhi, Kochi, Kolkata and Mumbai, and 29 sub-regional offices<sup>9</sup>.

**2.2 Government organizations and schemes relating to AVCs**

There are many schemes to promote AVCs under the above-mentioned central government policy. As so many schemes have been introduced, the tasks, roles and responsibilities of all concerned organizations working towards AVC development are entangled and sometimes tasks are duplicated. The main governmental bodies leading AVC development are the Ministry of Agriculture, MOFPI and Ministry of Commerce and Industry, and the list and general information of concerned organizations under the respective ministries are given in ANNEX 1.

The following section explains several of the main schemes relating to AVCs which need to be given special attention for this survey. The policies of all the schemes listed below are initially developed and managed by the central government, while authority for actual handling of the scheme, including project distribution of subsidies, implementation of the projects and monitoring, is held by the relevant departments of each state government. Each mission has their own office at central, state and district level. The common funding structure of governmental schemes is shown below.



Source: Study team

Figure 2-1 Funding structure of government schemes (MIDH)

Funds are released by the central government to state governments and utilized by the implementing bodies, such as district-level mission committees. In the case of the Mission for Integrated Development of Horticulture (MIDH), 85 percent of the fund is disbursed from central government and 15 percent is covered by the state mission, which is the state’s own budget. When it is disbursed to national-level agencies or boards directly by central government, each agency handles 100 percent of the fund.

<sup>9</sup> The information is acquired from the EIC website: <http://www.eicindia.gov.in/index.aspx#>

Each scheme prepares comprehensive guidelines for officials at state and district level to implement the scheme<sup>10</sup>. Most of the states follow the guidelines with minor adjustment based on regional requirements. Applications are normally processed online in order to avoid mismanagement as well as increase efficiency.

### 2.2.1 Mission for Integrated Development of Horticulture (MIDH)

The NHM was launched in 2005/06 as a Centrally Sponsored Scheme to promote holistic growth of the horticulture sector through area-based regionally-differentiated strategies. During the *Twelfth Five Year Plan* the NMH integrates several existing schemes in this sector, and this has taken off as MIDH from 2014/15. The mission has a general council at national level under the chairmanship of the Agriculture Minister, and members include the Ministers of Commerce, Finance, Food Processing Industries, Rural Development, Environment and Forest.

#### (1) Objectives

- Promote holistic growth of the horticulture sector, including bamboo and coconut, through area-based regionally-differentiated strategies, which include research, technology promotion, extension, post-harvest management, processing and marketing, in consonance with the comparative advantage of each state/region and its diverse agro-climatic features.
- Encourage aggregation of farmers into farmer groups, such as Farmers Interest Groups/FPOs and Farmer Producer Companies, to bring economies of scale and scope.
- Enhance horticulture production, augment farmers' income and strengthen nutritional security.
- Improve productivity by way of quality germ plasma planting material, and water use efficiency through micro irrigation.
- Support skill development and create employment generation opportunities for the rural youth in horticulture and post-harvest management, especially in the cold chain sector.

#### (2) Pattern of assistance

The summary of financial assistance is as follows.

Table2-4: Pattern of financial assistance of MIDH

Item	Assistance
Plantation infrastructure development and production	
Production	INR10-25 lakh/ha support for hi-tech, small nursery, seed production

<sup>10</sup> For instance, the guidelines for MIDH, see the following link. ([http://nhm.nic.in/Archive/MIDH\\_Guidelines\(final\).pdf](http://nhm.nic.in/Archive/MIDH_Guidelines(final).pdf))

Item	Assistance
Establishment of new gardens	INR1.5-5 lakh/ha support for planting fruit (strawberry, banana, pineapple, papaya, mango, guava, etc.), INR50, 000/ha for hybrid vegetables, INR15-20 lakh/unit for mushrooms, INR40, 000-1.5 lakh/ha for flowers, INR3-5,000/ha for spices, INR1 lakh /ha for aromatic plants, INR1 lakh/ha for plantation crops.
Protected cultivation	50% of cost for greenhouse, shade net house, plastic tunnel, anti-bird net, etc.
Organic farming	INR20,000/ha support for adoption of organic farming
Certification for Good Agriculture Practice (GAP)	50% of the cost
Mechanization	INR0.3-3 lakh/unit for tractor, power tiller and INR0.012-5 lakh/unit for plant protection equipment.
Enhancing post-harvest management	
Pack house	INR4 lakh/unit with size of 9 m x 6 m
Cold Storage	Credit linked back-ended subsidy <sup>11</sup> @ 35% of cost of project in general areas and 50% of cost in hilly & scheduled areas
Refrigerated transport vehicles	INR26 lakh for 9 tonnes. Credit linked back-ended subsidy @ 35% of the cost of project
Primary/Mobile/Minimal processing unit	INR25 lakh/unit
Ripening chamber	INR1 lakh/tonne. Credit linked back-ended subsidy @ 35% of the capital cost of project in general areas
Low-cost onion storage structure (mas 25 tonnes)	INR1.75 lakh/per unit
Establishment of marketing infrastructure for horticulture produce	
Terminal markets	INR150 crore/project, 25% to 40% (limited to INR50.00 crore) as Public-Private Partnership mode
Wholesale markets	INR100 crore/project, Credit linked back-ended subsidy @ 25% of the capital cost of project in general areas
Rural Markets/Apni mandies/Direct markets	INR25 lakh/project, Credit linked back-ended subsidy @ 40% of the capital cost of project in general areas
Establishment of Food Processing unit	
Food processing unit	INR800 lakh/unit, Credit linked back-ended capital investment assistance of 50% of cost in the states of Jammu and Kashmir, Himachal and Uttarakhand

Source: Prepared by Study Team based on the information from "12<sup>th</sup> Five Year Plan", "State of Agriculture" (DOA), and "The committee on encouraging investments in supply chains including provision for cold storages for more efficient distribution of farm produce" (Planning Commission)

<sup>11</sup> The subsidy supports to get bank loan to cover remaining project cost by guarantee.

## 2.2.2 National Mission on Food Processing (NMFP)

In the *Eleventh Five Year Plan*, a total allocation of INR600 crore was provided under the scheme for food processing industries, and this has assisted 3,229 food processing units. This scheme has added a huge capacity to the food processing industry, which in turn has resulted in significant reduction of wastage. The scheme has been transferred to the states with the launch of the National Mission on Food Processing (NMFP) in 2012 as a centrally-sponsored scheme. NMFP is implemented with financial contributions from the Government of India and states/UTs, at the ratio of 75:25. The state governments as implementers are given flexibility so that the schemes can be tailored to the different requirements of different regions in the country.

### (1) Objective

The main objective of the scheme is to increase the level of processing, reduce wastage, add value, enhance the income of farmers and increase exports, thereby resulting in the overall development of the food processing sector. The scheme envisages extending financial assistance for the establishment of new food processing units, as well as upgrading technology and expansion of existing units in the country.

### (2) Pattern of assistance

The scheme envisages financial assistance to food processing units in the form of grant-in aid.

Item	Assistance
Cost of plant & machinery and technical civil works for food processing units	25% of the cost, subject to a maximum of INR50 lakh in general areas, 33.33% of the cost and subject to a maximum of INR75 lakh in difficult areas (i.e. Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Andaman & Nicobar Islands and Lakshadweep), 50% of the cost and subject to a maximum of INR100 lakhs for North Eastern states including Sikkim.

Source: "State of Agriculture"(DOA)

## 2.2.3 Mega Food Parks Scheme (MFPS)

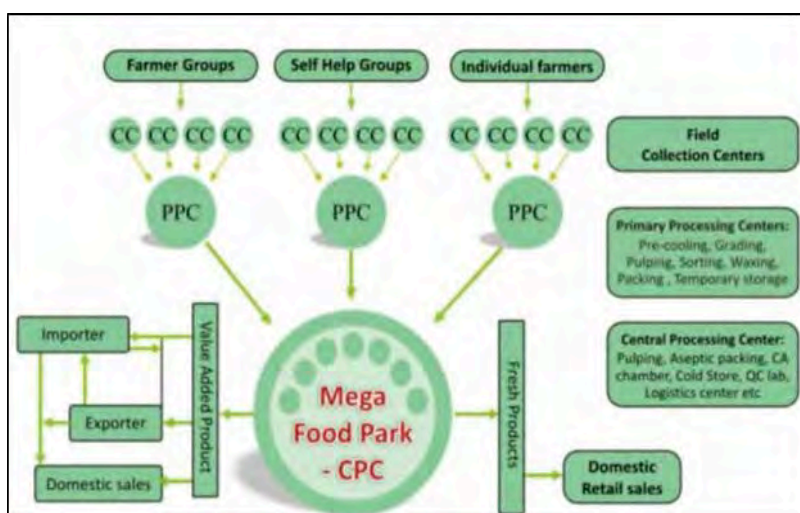
The Mega Food Parks Scheme (MFPS) implemented by MOFPI aims to accelerate the growth of the food processing industry in the country, by facilitating the establishment of strong food processing infrastructure backed by an efficient supply chain. The Ministry has taken up fifteen projects under the scheme out of thirty Mega Food Parks proposed under the *Eleventh Five Year Plan*. The total assistance from government to these projects is estimated at INR750 crore. In addition to these fifteen, new Mega Food Parks have recently been approved by the government. Based on the "Annual Report (2013-14)" of the MOFPI, following seven projects are currently operational.

- Srini Food Park P. Ltd., AP
- Patanjali Food & Herbal Park P Ltd., Ltd., Uttaranchal
- Jangipur Bengal Mega Food Park P Ltd., West Bengal
- Integrated Food Park P Ltd., Karnataka
- International Mega Food Park Ltd., Punjab
- Indus Mega Food Park P Ltd., Madhya Pradesh
- North East Mega Food Park. Assam

During the field survey, many stakeholders interviewed mentioned that Srini Food Park in AP and Tumkur Food Park in Karnataka are the most functional cases among these projects.

### (1) Objective

- The primary objective of the MFPS is to provide modern infrastructure facilities for food processing along the value chain from the farm to the market. It will include creation of processing infrastructure near the farm, transportation, logistics and centralized processing centers. The main feature of the scheme is a cluster-based approach. The scheme will be demand-driven, and will facilitate food processing units to meet environmental and safety standards.
- The expected outcome is increased income for farmers, the creation of high quality processing infrastructure, reduction in wastage, capacity building of producers and processors, creation of an efficient supply chain, along with significant direct and indirect employment generation.



Source: MOFPI

Figure 2-2: Basic concept of Mega Food Parks

## (2) Pattern of assistance

A capital grant is provided for the eligible total project cost excluding cost of land, pre-operating expenses and margin money for working capital. The land is in many cases provided by the state governments at a concessional rate.

Item	Assistance
Creation of common infrastructure in Central Processing Centre (CPC) and Primary Processing Centers (PPCs) in the food park.	Capital grant of 50% of the project cost is provided in general areas and 75% in difficult & ITDP-notified areas (with a ceiling of INR50 crore/project).

Source: "Annual Report 2013-14 "(MOFPI)

### <Srini Food Park>

Srini Food Park is located in Chittoor in AP on the Bangalore and Chennai corridor, within 150 km of major consumption markets, and was established and is managed by a food processing company that processes mango and tomato. It has four primary collection centers. Out of the total project cost of INR140 crore, INR50 crore is funded by the scheme. Multi-fruit pulping and aseptic filling, Tetra Pack, IQF (Individual Quick Freezing) facilities, cold storage and power/water/road infrastructure are available as common facilities. Currently three factories are operating in the Park, and the number is expected to increase in the coming years.

	
Multi-fruit processing line	Warehouse

Photos provided by: Corporate presentation of Srini Food Park (Pvt) Ltd

### <Tumkur Food Park>

This integrated mega food park, equipped with comprehensive cold chain facilities in Tumkur, Karnataka, was launched in September 2014. It was established and is managed by the Future Group, which owns one of the largest supermarket chains in India (Bigbazaar). According to the project manager, the total project cost is INR163 crore for full commissioning, and INR50 crore was funded by the scheme. It is located beside the Tumkur industrial estate, which is 70 km north-west of Bangalore and close to major markets and logistical

hubs. Six collection centers will be set up within 200 km. All basic facilities, such as electricity, water and roads, are ready to use for investors.



Site is under preparation for fully-fledged operation in 2015. Plots are allocated for lease by small- and medium-size enterprises.

*Photos: Study Team*

The concept of ‘Food Park’ or ‘Food industrial estate’ usually indicates the industrial cluster comprised of a number of enterprises who share the common objectives, infrastructure and facilities to increase production efficiency. It is typically developed and managed by some neutral entity such as municipality, cooperative, developer, food processing association and so on. The Food Parks in India, however, has different management structure from what we see in other countries, as they are developed and run by sole private food processing company. As the common facility is developed by the company with the government subsidy, it is not realistic for other companies doing same kind of business to share those facility. In stead of sharing plots in the estate with other companies, Srimi Food Park for example takes orders for consignment production from other companies. (It is producing fruits puree for other companies such as Dabur, Pepsi, Tetrapak etc) Some people interviewed in the survey indicated that this management structure of ‘Food Park’ hinders planned speedy expansion of the initiative in India.

#### **2.2.4 Integrated Scheme for Agricultural Marketing (ISAM)**

In order to provide a single window approach and user- and investment-friendly atmosphere, all the six schemes implemented during the period of the *Eleventh Five Year Plan* have been put under one umbrella, the “Integrated Scheme for Agricultural Marketing (ISAM). The *Twelfth Five Year Plan* outlay for ISAM is INR4,548 crore. The main components of the scheme are: (i) creating market infrastructure including Storage Infrastructure and Integrated Value Chain (IVC) Projects; (ii) creating Marketing Research and Information Network; (iii) strengthening Agmark Grading Facilities; (iv) developing agribusiness through venture capital assistance.

## (1) Objectives

- To promote agri-marketing through the creation of marketing and agribusiness infrastructure including storage
- To incentivize agri-market reforms
- To provide market linkages to farmers
- To provide access to agri-market information
- To support quality certification of agriculture commodities.

## (2) Pattern of assistance

The scheme envisages back-ended capital subsidy for investment in eligible storage and marketing infrastructure projects.

Item	Assistance
Establishing or renovating storage infrastructure	33.33% of total cost with ceiling of INR400 lakh
Infrastructure project other than storage infrastructure	33.33% of total cost with ceiling of INR500 lakh

Source: "Operation guideline 2014 ISAM" (DOA)

The above-mentioned major missions and other schemes managed by central government include various support schemes and sub-projects, and those are not handled by a sole agency but many concerned organizations; this situation makes the support structure complicated and roles overlap. The table below tabulates organizations working towards the respective goals for encouraging investment in AVCs.

Table 2-5: Sector-wise mission/scheme and concerned organizations

Sector	Mission/Scheme	Lead agency	Concerned organizations
Horticulture Production	MIDH	DOA (NHM)	NHM: Lead agency for all programs NHB: Implement sub-schemes for development of commercial horticulture NLAs: CDB, DCCD, DASD, NMPB, etc. for concerned crop production.
	NMSA	DOA	* For detail, see ANNEX 1
	NFSM		* For detail, see ANNEX 1
	RKVY		* For detail, see ANNEX 1
Livestock/ Dairy	NDP	AH&D	NDDB: Implement programs
	Dairy Entrepreneur Scheme	AH&D	* For detail, see ANNEX 1
Cold Chain	MIDH	DOA (NHM)	NHM: Support directly to farmers, including small size (below 5000 tonne) projects.

Sector	Mission/Scheme	Lead agency	Concerned organizations
			NHB: Support directly to entrepreneurs/enterprises. Focused on over middle size (5000 tonne capacity) projects. NCCD: Guide policy and set standards for development of cold chain.
	NFPM	MOFPI	MOFPI: Support comprehensive cold chain, not only storage but pre-cooling centers to reefer vans, up to INR10 crore.
	-	MoC (APEDA)	APEDA: Support export-oriented cold chain up to INR25 lakh.
Food Park	MFPS	MOFPI	MOFPI as lead agency and technical/approval committee consists of Min of Agriculture and Finance, Planning Commission, APEDA, ICAR
Agriculture Marketing	ISAM	DOA (Agri-Marketing Division)	AMD: Lead total mission management from infrastructure development to information network and including APMC reform NABARD, NCDC: Operate the fund
	MIDH	DOA	NHM: 40% of total project cost or max INR50 crore for construction of markets.
	PEG scheme	DFPD	* For details, see ANNEX 1 (Support to construct godowns)
Food Processing	NMFP	MOFPI	MOFPI: Lead by National Food Processing Development Council for total management DOA, AH&D, DARE, DCA as members.
	MIDH		NIFTEM: Assist with setting up food standards and business incubation.
	MIDH	DOA	NHM: 40% of total project cost or max INR50 crore for construction of markets.
	PEG scheme	DFPD	* For details, see ANNEX 1 (Support to construct godowns)

Source: Study team

## **2.3 Other programs related to AVC**

### **2.3.1 Promotion of Farmers Producer Organization (FPO)**

Small farmers who occupy the majority of the farm population in India have a natural disadvantage to achieve scale to justify high investment. Access to critical inputs such as quality seed, fertilizers, irrigation water, power and credit are lacking for small individual farmers. Most farmers do not have access to the consumer market and therefore are forced to sell their products to the numerous intermediaries operating in the market, and it reduces their profit margin. One of the ways to overcome these challenges for farmers could be to collectivize them into groups, and the government is trying to promote the concept of an FPO. Under the 12th Five Year Plan, promotion and strengthening of FPOs has been one of the key strategies to achieve inclusive agricultural growth. FPO were traditionally organized under the cooperative structure, but as it has problems with efficiency and various legal obstacles, the government provided a regulatory framework for FPO similar to that of companies while retaining the unique elements of a cooperative business.

The SFAC, a society under the Department of Agriculture, is designated as a single-window agency for technical support, training needs, research and knowledge management for FPOs to create linkage with investment and the market. By deploying the funds of RKVY, the government provides funds through SFAC for 1) a matching equity grant of up to INR 1 million to double the share capital of FPOs, 2) a credit guarantee fund with a corpus of INR 1 billion (created in SFAC) to financial institutions which lend to FPOs without collateral. The NABARD also has emerged as the driving force in supporting FPOs. NABARD launched its INR 20 billion 'Food Processing Fund' in 2014, where FPOs will be one of the recipients.

### **2.3.2 Agri Export Zones (AEZ)**

The Indian government announced the AEZ concept under the Export Import policy 2001-2002. The main objective of AEZ is to promote agricultural exports from the country and to ensure a remunerative return to the farmers in a sustainable manner. It attempts to provide comprehensive support from production to marketing to a particular crop which is identified as having potential, as well as the geographical region in which these crops are grown. Therefore, AEZ aims to 1) bring the central and state governments and local agencies in the value chain to one single point, 2) reduce transaction costs, 3) reduce delays at all stages of the export process. APEDA is the nodal agency to coordinate the concerned organizations. Currently, there are 60 AEZs across 20 states.

The interventions to support AEZs include financial, fiscal and administrative action. Various schemes of the central and state governments are converged and priority for assistance related to agricultural export

related activities is given to AEZ. Duty free handling is available for importing all kinds of input in AEZ. Exports of value added agricultural products will be eligible for sourcing duty free fuel for generating power.

## 2.4 State Policy

In the field survey, the Study team visited the states of Karnataka, AP, Telangana, Gujarat, Kerala, Maharashtra, Himachal Pradesh and Odisha, and interviewed concerned governmental organizations in each state. Based on these interviews, the current situation/issues and key policies for the agriculture sector and AVCs in each state are summarized below.

Table 2-6: State situation and policy

State	Status/Issues	Key policy
Karnataka	It is a prominent state for horticulture production and leading agribusiness sector in India. Fruit production volume is 3rd highest for mango and papaya, 5th for banana among all states. For vegetables, 2nd for tomato and 4th for onion. Strong linkage with research such as University of Agricultural Sciences (UAS). Due to liberalization policy, many multinational companies involved in horticulture sector, which led to exposure of farmers to new and high yield varieties. Contract farming for export crops is practiced by many companies. APMC reform is most advanced. Implementation rate of NHM and NHB is one of the highest.	The <i>Agriculture Policy 2006</i> focuses on rain-fed crops and sustainable cultivation. The state announced its <i>Agriculture marketing policy 2013</i> , recommending warehouse-based sales, rationalization of private markets, market fee waiver for perishable produce, and focus on direct purchase centers. The state also has an <i>Integrated Agribusiness Development Policy 2011</i> , aimed at promoting productivity, agro-infrastructure, agro-based industry, agro-exports and investment.
AP	It is one of the largest producers (9.84 million tonnes per year) of fruits in India (mango, papaya, citrus, tomato, okra), and also a pioneer in use of water-saving technology like drip irrigation/sprinkler. Earlier advantage like large number of seed industries existing in the state are now located in Telangana, while large part of areas affected by natural calamities are still in AP.	After bifurcation, the new AP state recognizes agriculture sector as its engine for growth and set the annual growth rate at 11 percent through holistic approach. For horticulture sector, focus is: -Increase production and productivity through rejuvenation of orchard, organic farming, hybrid varieties, tissue culture crops and inter-cropping. - Encourage efficient and effective utilization

State	Status/Issues	Key policy
		<p>of water usage through micro-irrigation.</p> <ul style="list-style-type: none"> <li>- Promote Integrated Pest Management (IPM) and Integrated Nutrient Management (INM).</li> <li>- Adopt pre and post-harvest management through modern technology.</li> <li>- Facilitate value addition and marketing of horticulture products by reviving AEZ.</li> <li>-Give emphasis to knowledge inputs.</li> <li>-Encourage crop-specific clusters and work with NREGA.</li> </ul>
Telangana	<p>Agriculture plays a pivotal role in the economy of the state. Major horticulture crops are red chili, turmeric and mango. The sector in the state suffers stagnation, low productivity, frequent occurrence of droughts, and low level of public and private investment.</p>	<p>The state government set a strategy to attain development of the agriculture sector by enabling every farmer to achieve sustainable and economic agricultural productivity. It sets targets as below:</p> <ul style="list-style-type: none"> <li>-Growth rate of 6 percent per year and increasing returns on investment for farmers through improved technology.</li> <li>-Promote effective extension reach.</li> <li>-Promote mechanization, marketing tie-ups, and adequate credit crop insurance.</li> </ul>
Gujarat	<p>The one of main sources of growth in the state are from cotton production, high value food production from livestock and dairy, fruit and vegetables. The annual growth rate of the sector of 9% is the highest in India. The adoption of cooperatives is widely attributed with much of the success, particularly dairy cooperatives like Amul.</p>	<p>Horticulture department focuses on following areas: production of spice (kumin, isbgol), mango, flowers, nursery, seedlings, grafting. It needs low-cost technology for greenhouses, equipment for small farmers, high quality seeds, processing. It promotes clustering farmers to develop export-oriented products.</p>
Kerala	<p>The main agriproducts are coconut, rubber and spices. Vegetables and rice are imported from other states. Initiatives for post-harvest management such as development of cold chain or grading are lagging behind. There is no APMC or its</p>	<p>The state issued its agricultural development policy in 2013; this is small farmer-oriented and targets making Kerala a bio-agriculture state by 2016. A database of farmers has been prepared to help departments to work out schemes more effectively.</p>

State	Status/Issues	Key policy
	Act, but original and independent markets are set up with support of the European Union (EU).	
Maharashtra	In addition to high production of principal crops such as rice, wheat and pulses, the state has a huge area under fruit cultivation of mango, banana, grapes and oranges. Irrigation facilities are being extended so that agriculture could be made less dependent upon rainwater.	The state's <i>Agro industrial policy 2010</i> focuses on agri-clusters based on production strengths (pomegranate, grapes, potato, tamarind, etc.), market-led extension service, market linkages, promotion of food quality and safety. It also issued a special policy to promote organic farming as an integrated method which rejects the use of chemicals for cultivation. Marketing board is active and promotes export, GAP certificate, and common grading and packing facilities. The state is also active in implementing international donor projects with ADB, WB and IFAD. (See ANNEX 3)
Himachal Pradesh	The main crops are tomato, pulse, cabbage. Utilizing its geographical features, the state is active in cultivation of seasonal crops which can be marketed at a high price in low-lying areas. The challenges faced are the need for instant selling due to lack of processing and storage facilities, and finding markets. There is no marketing section in the agriculture department.	The state policy on horticulture focuses on extension of greenhouse cultivation and irrigation. It conducts a scheme to support 85% of investment for greenhouses targeting to expand to 150 ha.
Odisha	The varied agro-climatic conditions in the state are suitable for cultivating horticulture crops. It is one of the major vegetable-producing states, second for brinjal and cabbage, fourth for okra and tomato, fifth for cauliflower among all the states. Mango, ginger and turmeric are also important crops grown in the state. Proportion of marginal and small-scale farmers accounts for 90% of total farmer	The state's <i>Agriculture policy 2013</i> focuses on below issues: -Shift to profitable commercial agriculture enhancing important crops. -Focus on horticulture and organic farming. -Facilitate investment by PPP for post-harvest management, marketing and value addition. -Encourage contract farming to facilitate market linkages and market-driven production.

State	Status/Issues	Key policy
	population. There is no APMC. Currently only 0.7 percent of the total produce is processed in the state.	-Create appropriate institutions for regulatory and quality assurance activities. -Increase access to credit for small farmers. Also the state Food Processing Policy 2013 aims to increase food processing in the state by 10 percent by 2017 and 25 percent by 2025.

Source: Study team

For AP, Telangana and Odisha which were selected as priority states for detailed VC survey, details of status and policy in each state are explained in Chapter 5.

## 2.5 Donor Projects

The WB has been a major donor in assisting with VCs for both horticultural crops and dairy products. The ADB has recently started its assistance with AVCs for horticultural crops.

### (1) Horticulture

#### 1) World Bank

The World Bank has assisted the agricultural sector in India mainly in the areas of water resource management, rural livelihood development and farming. In recent years it has shifted the emphasis of its assistance from research to improving competitiveness, and from productivity improvement to market-oriented production.

As agriculture is a state issue, WB provides assistance only at the state level. Currently it provides assistance to Agricultural Competitiveness Projects in three states - Assam, Maharashtra and Rajasthan - and Himachal Pradesh is in the pipeline. The outline of these projects is shown below.

Table 2-7: Ongoing WB projects on AVC

Project title	Approval date	Closing date	Project cost (million USD)	Commitment amount (million USD)
Assam Agricultural Competitiveness Project	December 2004	March 2015	214.33	154.00
Maharashtra Agricultural Competitiveness Project	September 2010	December 2016	100.00	100.00
Rajasthan Agricultural Competitiveness Project	March 2012	April 2019	166.50	109.00

Source: WB website

The characteristics of WB's assistance to agriculture sector are twofold: market orientation and an emphasis on agribusiness. As no one can predict market behavior, a WB project does not focus on specific crops. It deals with all crops - not only grains but also vegetables and fruit. Instead a project places a high priority on developing alternative market channels such as contract farming, direct sales and collective sales. It places a lot of emphasis on agribusiness.

The emphasis on agribusiness is based on the importance of producing non-agricultural employment, such as in food processing in rural villages. In order to encourage rural entrepreneurs to start their business, the project provides them with incubation services such as supporting business plan development, training and business matchmaking.

The components of the three Agricultural Competitiveness Projects are not exactly the same, as the needs of the respective states are different. As agriculture in Assam is mostly at subsistence level, the main focus of assistance is improving productivity to produce a market surplus. In the case of Rajasthan, the biggest constraint is shortage of water. Therefore the emphasis of the project is placed on the promotion of integrated farming and water-saving techniques such as drip irrigation and water harvesting. In Maharashtra, which is most advanced in terms of agricultural marketing, the focus is on the development of alternative marketing channels, promoting agribusiness and institutional development of government entities. Although these projects do not focus on specific crops as indicated earlier, a new project planned for Himachal Pradesh will be somewhat different as it will focus on horticultural crops. The new project should be approved within one and a half years.

## **2) Asian Development Bank**

The Asian Development Bank (ADB) has assisted the agriculture sector in India mainly in the area of water resource development. However it extended its Multitranches Financing Facility (MFF) to finance the Agribusiness Infrastructure Development Investment Program (AIDIP) in 2010. This project is the first of this kind to assist AVCs for ADB.

The main focus of the AIDIP is agriculture marketing infrastructure development under Public-Private Partnership (PPP). As infrastructure development has been a priority for ADB, technical assistance components are minimal. The project is implemented in Maharashtra and Bihar. The former was selected as an advanced state, while the latter was selected as a backward state.

Table 2-8: Outline of AIDIP

Type or Modality of Assistance	Loan
Approval Date	16 Sep 2010
ADB Financing	USD170 million
Geographical Location	Bihar and Maharashtra States
Impact	Greater value of horticulture products captured by stakeholders of integrated value chains (IVCs) in selected regions of Bihar and Maharashtra.
Components	Five components for selected horticultural value chains: (i) marketing intelligence; (ii) technology dissemination and development; (iii) value chain linkage development; (iv) market infrastructure development; and project management.

Source: ADB website

The project assists market infrastructure development with a hub and spoke model for two IVCs in each state. Integrated value chains are the VC for potential crops such as grape, pomegranate and tomato. The infrastructure to be developed consists of a central processing center which is fully equipped for processing, and primary processing centers which are located at village level and supply crops to the central processing center. There are between fifteen and twenty primary centers for one central center. The infrastructure development will be financed by PPP, with a 35-40 percent contribution from government and the rest from the private sector. The officials of ADB indicated that they have difficulty in attracting private investors as the conditions offered are not necessarily favorable compared with other government schemes such as the Mega Food Parks Scheme, in which the government subsidizes half the construction cost. There have also been procedural delays in Bihar.

In addition to infrastructure development, AIDIP provides two types of technical assistance. First, it has a technical assistance component which can support necessary surveys and capacity development of stakeholders. The other type of technical assistance is financed through the Japan Fund for Poverty Reduction (JFPR), which assists group formation, capacity development and technical improvement of small farmers. It has a plan to establish a small revolving fund to provide microcredit to entrepreneurs for their business start-up.

## (2) Dairy/Livestock

In order to meet the growing demand for milk in India, the *National Dairy Plan*, has been launched as

a scientifically-planned, multi-state fifteen-year initiative. The first phase of the *National Dairy Plan* (NDP I), which is a central support scheme for the Department of Animal Husbandry, Dairying and Fishery implemented through the National Dairy Development Board (NDDB) from 2011/12 to 2016/17, is financed largely by the World Bank. NDP I costs INR2,242 crore, comprising INR1,584 crore as credit from the World Bank (International Development Association credit), INR176 crore from the Government of India, INR282 crore from End Implementing Agencies (EIAs) that will carry out the projects in participating states, and INR200 crore from NDDB. The objectives of NDP I are: i) to help increase the productivity of milch animals and thereby increase milk production to meet the rapidly-growing demand for milk; and ii) to help provide rural milk producers with greater access to the organized milk processing sector. Scientific breeding and nutrition are the focus for increasing productivity of milch animals. For greater access to the organized milk processing sector, NDP I supports expanding and setting up village-based milk procurement systems to collect milk in a fair and transparent manner, and strengthening existing dairy cooperatives and producer companies.

## **2.6 Issues and bottlenecks for VC assistance**

- The Government placed high priority on promoting horticulture. It has provided a broad range of assistance schemes for horticulture. However in order to cover the broad areas, the assistance tends to be fragmented in nature. Consequently there are opinions that the assistance is not delivered to those needed and not effective.<sup>12</sup>
- Department of Agriculture in state government is going through structural changes from traditional grain-based system to more cash crop oriented structure by increasing the number of horticulture officers. As the reform is still on-going, the number of horticulture officers is not sufficient. Besides they are made busy with coordinating for those government schemes as they have targets to achieve. Although there are many dedicated officers on the ground, it is not realistic to deliver their services to all the needed farmers.
- Department of Agriculture in the state government is in charge of tasks related to AVC from production to post-harvest. Marketing of agricultural produce is not covered by Department except the management of APMC market. There is no linkage of work with Department of Industries for food processing. Thus there is a mismatch of policy that Department promotes processing varieties where no processing unit exist or farmers are not interested in post-harvest processing as there is no market for their produce.

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<sup>12</sup> Based on the hearing from Horticulture Commissioner of AP state government.

### 3. Current Status of and Bottlenecks in Agricultural Value Chains

#### 3.1 Horticulture Sector

##### 3.1.1 Overview of the sector

##### (1) Position of Indian horticulture production in the world

Table 3-1: Major fruit-producing countries  
(2012/13)

Country	Area (ha)	Production (tonnes)	Productivity (tonne/ha)
China	11,834,450	137,066,750	11.6
India	6,982,015	81,285,334	11.6
Brazil	2,325,385	38,368,678	16.5
US	1,137,779	26,548,859	23.3
Indonesia	796,530	17,744,411	22.3
Philippines	1,240,370	16,370,976	13.2
Mexico	1,256,730	15,917,806	12.7
Turkey	1,102,662	14,974,561	13.6
Spain	1,539,100	13,996,447	9.1
Italy	1,125,593	13,889,219	12.3
Others	27,924,521	270,594,597	9.7
World	57,265,135	646,757,638	11.3

Source: FAOSTAT

Table 3-2: Major vegetable-producing countries  
(2012/13)

Country	Area (ha)	Production (tonnes)	Productivity (tonne/ha)
China	24,560,900	573,935,000	23.4
India	9,205,186	162,186,567	17.6
US	1,104,640	35,947,720	32.5
Turkey	1,111,702	27,818,918	25.0
Iran	876,830	23,485,675	26.8
Egypt	772,487	19,825,388	25.7
Russia	790,500	16,084,372	20.3
Mexico	683,294	13,599,497	19.9
Spain	318,971	12,531,000	39.3
Italy	450,186	12,297,645	27.3
Others	19,096,425	261,467,661	13.7
World	58,971,121	1,159,179,443	19.7

Source: FAOSTAT

Table 3-1 gives the total area and production of fruit in the major fruit-producing countries in 2012/13. It shows that India produced about 12 percent of total fruit production in the world in this period in terms of quantity; 34 percent of world total banana, 44 percent of mango, and 42 percent are produced in India. The table also shows that productivity of fruit production in India is at almost the same level as the world average, and much lower than countries such as the US and Indonesia.

Table 3-2 depicts the total area and production of vegetables in the major vegetable-producing countries of the world in the same period. It shows that total vegetable production in India in this period comprises about 14 percent of total world production; 27 percent of world total brinjal (eggplant) and 12 percent of cabbage are produced in India. The table also shows that the productivity of vegetable production is slightly lower than the world average, and much lower than even some emerging countries such as China, Turkey, Iran and Egypt.

## (2) Horticulture sector in India

### 1) Trend of horticulture production

Table 3-3: Trend of horticulture production, area, and productivity in India

Year	Fruits			Vegetables			Flowers			Plantation Crops		
	Area (thousand HA)	Production (thousand MT)	Productivity (MT/HA)	Area (thousand HA)	Production (thousand MT)	Productivity (MT/HA)	Area (thousand HA)	Production (thousand MT)	Productivity (MT/HA)	Area (thousand HA)	Production (thousand MT)	Productivity (MT/HA)
2003-04	4,661	45,942	9.9	6,082	88,334	14.5	101	580	5.7	3,102	13,161	4.2
2004-05	5,049	50,867	10.1	6,744	101,246	15.0	118	659	5.6	3,147	9,835	3.1
2005-06	5,324	55,356	10.4	7,213	111,399	15.4	129	654	5.1	3,283	11,263	3.4
2006-07	5,554	59,563	10.7	7,581	114,993	15.2	144	880	6.1	3,207	12,007	3.7
2007-08	5,857	65,587	11.2	7,848	128,449	16.4	166	868	5.2	3,190	11,300	3.5
2008-09	6,101	68,466	11.2	7,981	129,077	16.2	167	987	5.9	3,217	11,336	3.5
2009-10	6,329	71,516	11.3	7,985	133,738	16.7	183	1,021	5.6	3,265	11,928	3.7
2010-11	6,383	74,878	11.7	8,495	146,554	17.3	191	1,031	5.4	3,306	12,007	3.6
2011-12	6,705	76,424	11.4	8,989	156,325	17.4	254	1,652	6.5	3,577	16,359	4.6
2012-13	6,982	81,285	11.6	9,205	162,187	17.6	233	1,729	7.4	3,641	16,985	4.7
2013-14	7,136	84,411	11.8	9,609	170,248	17.7	242	1,847	7.6	3,690	17,462	4.7
% increase (2003-2013)	53%	84%	20%	58%	93%	22%	140%	219%	33%	19%	33%	12%



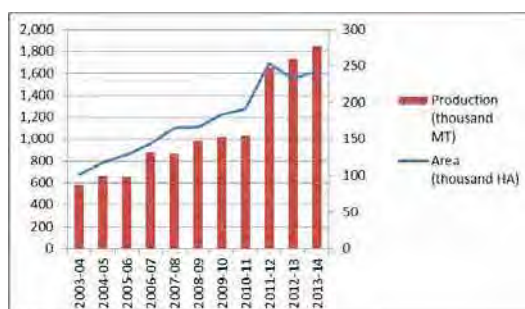
Source : Director of Horticulture/Agriculture of respective State/UT

Figure 3-1: Trend of fruit production



Source : Director of Horticulture/Agriculture of respective State/UT

Figure 3-2: Trend of vegetable production



Source : Director of Horticulture/Agriculture of respective State/UT

Figure 3-3: Trend of flower production



Source : Director of Horticulture/Agriculture of respective State/UT

Figure 3-4: Trend of plantation crop production

Table 3-3 depicts the trend of horticulture production in India in terms of harvesting area, production quantity and productivity, and Figures 3-1, 3-2, 3-3, and 3-4 are graphical representations of area and production. These show that the production of every kind of horticultural crop has increased dramatically

between 2003 and 2013, with the growth rate of production for fruit, vegetables, flowers, and plantation crops being 84 percent, 93 percent, 219 percent, and 33 percent respectively.

It is observed that productivity growth during this period has been driven more by the increase in harvesting area than by productivity growth, as the growth rates of productivity are much lower than those of harvesting area for all kinds of horticultural crop.

## 2) Export of horticulture crops

Table 3-4: Export of fresh fruits from India (2012/13)

Commodity	Quantity (tonnes)	Value (lakh INR)	Major importing countries
Fresh fruit total	497,595	250,374	
Grapes	172,744	125,943	Netherlands, UAE, UK, Russia
Mango	55,585	26,472	UAE, UK
Banana	50,004	13,064	UAE, Saudi Arabia, Oman, Pakistan
Orange	33,628	3,529	Bangladesh, Nepal
Apple	23,806	5,151	Bangladesh, Nepal
Papaya	16,491	3,329	UAE, Saudi Arabia, Netherlands
Pineapple	2787	837	Qatar, Nepal, Maldives, Bahrain,
Guava	1,180	351	Saudi Arabia, Tanzania, Sudan, UAE
Litchi	795	118	Bangladesh, Nepal
Other fresh vegetables	140,575	71,580	

Source: Indian Horticulture Database 2013

Table 3-5: Export of fresh vegetables from India (2012/13)

Commodity	Quantity (tonnes)	Value (lakh INR)	Major importing countries
Fresh vegetables total	2,435,500	348,296	
Onion	1,666,873	196,663	Malaysia, Bangladesh, UAE, Sri Lanka
Tomato	343,692	53,305	Pakistan, UAE
Potato	163,186	14,872	Nepal, Sri Lanka, Maldives
Peas	3,146	765	Pakistan, UK, Saudi Arabia, Nepal
Sweet potato	632	104	UAE
Cabbage	573	41	Maldives, UAE, Nepal
Cauliflower	357	25	Maldives, UAE, Pakistan
Other fresh vegetables	257,041	82,521	

Source: Indian Horticulture Database 2013

Table 3-4 and 3-5 depict the export quantities and values of fresh fruit and vegetables respectively from India in 2012/13. One can see that the volume of fruit and vegetables exported is quite small compared to the total volume produced. For example, the export volume of fresh fruits in 2012/13 is about 500,000

tonnes, which is about 0.6 percent of total fruit production. Also, the export of fresh vegetables is about 2,400,000 tonnes, which is 1.4 percent of total vegetable production.

As shown in Table 3-4, the export of grapes is prominent among fresh fruit exports, and the export of bananas and mangoes is also significant. The export of onions is predominant in the export of fresh vegetables.

### 3) Crop-wise production

Table 3-6: Major fruits produced in India (2013/14)

Fruits	Production (tonnes)
BANANA	27,575
MANGO	18,676
PAPAYA	5,544
SWEET ORANGE	3,398
GUAVA	3,318
MANDARIN	2,967
LIME/LEMON	2,569
APPLE	2,544
GRAPES	2,504
PINEAPPLE	1,690
OTHERS	13,625

Source: Indian Horticulture Database 2013

Table 3-7: Major vegetables produced in India (2013/14)

Vegetables	Production (tonnes)
POTATO	46,395
ONION	19,299
TOMATO	19,104
BRINJAL (Eggplant)	13,888
CABBAGE	9,126
CAULIFLOWER	8,618
TAPIOCA	7,737
OKRA	6,609
PEAS	4,239
RADISH	2,546
OTHERS	32,687

Source: Indian Horticulture Database 2013

Table 3-8: Major plantation crops produced in India (2013/14)

Plantation Crops	Production (tonnes)
COCONUT	16,056
CASHEWNUT	757
ARECANUT	631
COCOA	18

Source: Indian Horticulture Database 2013

Table 3-9: Major flowers produced in India (2013/14)

Flowers		Production (tonnes)
ROSE	LOOSE	92
	CUT	21,337
GLADIOUS	LOOSE	52
	CUT	7,733
TUBE ROSE	LOOSE	40
	CUT	1,591
GERBERA	LOOSE	4
	CUT	1,471
MARIGOLD	LOOSE	498
	CUT	765
OTHERS	LOOSE	1,162
	CUT	46,535

Source: Indian Horticulture Database 2013

Tables 3-6, 3-7, 3-8 and 3-9 depict the major crops of fruit, vegetables, plantation crops and flowers

respectively in terms of volume of production in India in 2013/14. With fruit production, bananas and mangoes are most prominent, and the production of papayas and oranges is significant. For vegetables, potatoes are most significant in terms of production volume, followed by onions, tomatoes, and brinjals (eggplant). For plantation crops, coconuts are predominant, and there is a small production of cashew and arecanut. Rose is the most popular flower in production.

#### 4) Horticulture production by state

Table 3-10 State-wise production of horticulture products 2013/14 (thousand tonnes)

STATE/UT'S	FRUITS	VEGETABLE	FLOWERS		PLANTATION
			LOOSE	CUT	
ANDAMAN & NICOBAR	29.7	51.8	0.3	-	95.7
ANDHRA PRADESH	14,219.3	12,422.1	251.1	7,152.0	1,482.9
ARUNACHAL PRADESH	322.2	35.0	0.0	297.0	
ASSAM	2,210.2	3,479.9	20.0	5,000.0	184.5
BIHAR	4,491.2	16,572.7	10.0	346.0	96.9
CHHATTISGARH	1,930.2	5,502.4	45.7		25.6
D & N HAVELI		5.5			
DAMAN & DIU					
DELHI		483.7	5.7	1,038.0	
GOA	81.6	80.9	0.0	17.5	121.7
GUJARAT	8,413.2	11,433.6	149.3		246.4
HARYANA	550.0	6,000.0	67.3	1,270.5	
HIMACHAL PRADESH	837.0	1,514.4	37.7	1,760.3	
JAMMU & KASHMIR	2,073.7	1,395.5	0.4	224.1	
JHARKHAND	890.0	4,236.7	22.0	1,711.0	1.2
KARNATAKA	6,936.9	7,354.9	212.8	9,788.6	4,778.0
KERALA	2,584.0	3,445.6			4,199.2
LAKSHADWEEP	0.5	0.3			48.8
MADHYA PRADESH	5,691.9	12,966.5	199.5		
MAHARASHTRA	10,021.0	10,112.0	128.0	7,914.0	375.2
MANIPUR	525.8	274.5			
MEGHALAYA	339.4	428.0			29.9
MIZORAM	344.4	260.5	171.5	513.2	4.4
NAGALAND	375.7	483.4		66.3	11.3
ODISHA	2,148.3	9,433.7	37.4	6,017.5	577.7
PUDUCHERRY	10.0	14.7	0.9		15.9
PUNJAB	1,528.6	3,907.6	10.5		
RAJASTHAN	444.6	1,366.1	3.1		
SIKKIM	24.4	132.0	30.0	225.9	
TAMILNADU	7,370.0	8,678.5	343.7	1,284.8	4,843.4
TRIPURA	638.8	760.2			34.0
UTTAR PRADESH	5,378.3	20,341.0	32.2	5,037.0	
UTTARAKHAND	805.7	1,059.6	1.8	3,633.0	
WEST BENGAL	3,194.0	26,015.0	66.5	26,135.0	289.4
<b>TOTAL</b>	<b>84,410.7</b>	<b>170,248.1</b>	<b>1,847.4</b>	<b>79,431.7</b>	<b>17,462.2</b>

Table 3-10 depicts the state-wise production volume of fruit, vegetables, flowers and plantation crops in 2013/14. It shows some geographical characteristics in horticulture production. For example, it can be seen that both fruit and vegetable production is significant in the western and southern states such as AP, Karnataka, Maharashtra and Gujarat. Vegetable production is prominent in the central and eastern states such as Madhya Pradesh, Uttar Pradesh, Bihar and West Bengal, but fruit production is relatively insignificant in these states.

Also, considerable amounts of flowers are produced in southern states such as AP, Karnataka, Maharashtra, and Odisha. Yet one can see that flower production in West Bengal and Assam is also significant.

The production of plantation crops (most of which is coconut) is concentrated in southern states such as Tamil Nadu, Karnataka, Kerala and AP.

### (3) State-wise production and wholesale arrivals of major horticulture products

#### 1) Fruit

Table 3-11: State-wise production of major fruits in 2013/14 (thousand tonnes)

STATES/UTs	APPLE	BANANA	GRAPES	GUAVA	LIME/LEMON	MANGO	MANDARIN	SWEET ORANGE	PAPAYA	PINEAPPLE
ANDAMAN NICOBAR		14.0		0.2	1.43	3.9	0.39	0.48	2.7	2.3
ANDHRA PRADESH		3,356.8	34.3	191.0	765.53	4,561.8		2957.41	1,710.0	
ARUNACHAL PRADESH	31.9	19.1								69.6
ASSAM		892.7		107.7	132.60	56.3	213.60	1.85	176.5	285.7
BIHAR		1,789.3		260.2	136.91	1,488.3			50.2	145.1
CHHATISGARH		498.8		162.8	78.79	327.9		1.83	286.8	
D & N HAVELI										
DAMAN & DIU										
DELHI										
GOA		26.3				8.9				4.8
GUJARAT		4,523.5		158.1	433.12	1,003.7			1,189.3	
HARYANA			-	114.2		125.9				
HIMACHAL PRADESH	738.7	0.0	0.1	3.6	3.17	25.4	9.01	1.04	0.5	
JAMMU & KASHMIR	1,647.7		0.5	5.8		7.0				
JHARKHAND		1.3		95.4	87.67	517.9			5.1	
KARNATAKA		2,656.1	331.8	137.6	283.50	1,902.8	74.00	52.10	478.6	174.4
KERALA		515.7				441.0			96.9	72.9
LAKSHADWEEP		0.3		0.0					0.1	
MADHYA PRADESH		1,735.0	2.0	841.1	237.40	379.8	894.60	109.00	433.7	
MAHARASHTRA		3,694.0	2,050.0	316.0	248.00	640.0	392.00	238.00	401.0	
MANIPUR		100.5			52.65		41.20			136.4
MEGHALAYA		86.0			3.96		40.89		6.0	113.1
MIZORAM		140.9	23.9	2.6	25.60	3.7	40.43	4.86	24.6	30.1
NAGALAND	2.0	93.6	1.2	4.0	12.00	4.0	54.00	2.08	13.5	141.0
ODISHA		476.6		103.6		751.0			72.2	10.4
PUDUCHERRY		6.0		0.3	0.14	3.1				
PUNJAB		10.0	12.8	181.0	4.95	107.6	1002.45	22.45		
RAJASTHAN		1.0	0.0	77.8	19.47	73.9	117.09	2.66	16.4	
SIKKIM	0.0	3.8		1.1			16.50		0.6	
TAMIL NADU	0.0	5,650.0	47.7	50.8	22.15	785.5	4.12	3.84	202.7	22.9
TRIPURA		70.2		2.8	18.55	29.0	28.50	0.00	27.5	165.5
UTTAR PRADESH		115.8		303.2	1.67	4,564.2			14.0	
UTTARAKHAND	123.2			11.4		148.6				
WEST BENGAL		1,097.5		186.0		715.0	38.60		335.0	316.0
<b>TOTAL</b>	<b>2,543.5</b>	<b>27,574.8</b>	<b>2,504.1</b>	<b>3,318.0</b>	<b>2569.26</b>	<b>18,676.5</b>	<b>2967.38</b>	<b>3397.60</b>	<b>5,543.9</b>	<b>1,690.3</b>

Source: Indian Horticulture Database 2013

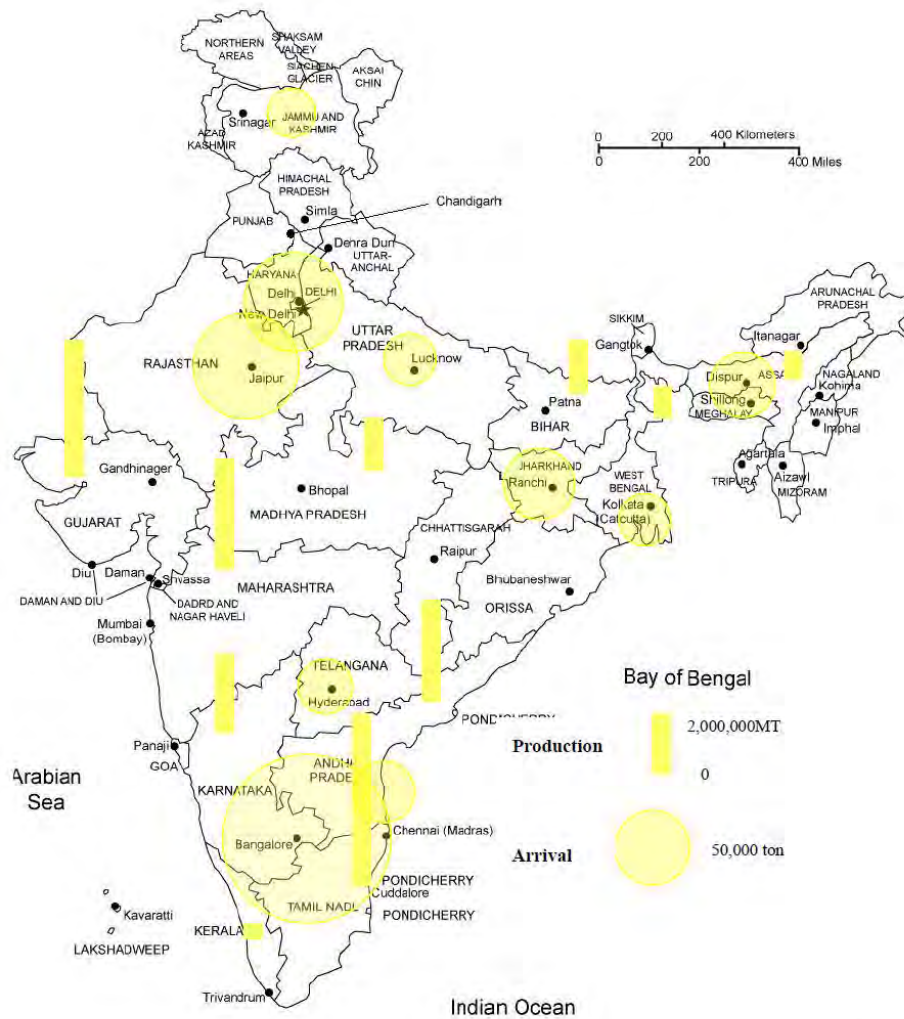
Table 3-12: Annual amount of arrivals of major fruits to wholesale markets in 2013 (tonnes)

Market	State	Apple	Banana	Grapes	Guava	Lemon	Mango	Orange	Pineapple
ABOHAR	Punjab	10	9,890			748	103	8	2,060
AGRA	Uttar Pradesh	2,986	12,350	3,101		4,815		3,116	
AHMEDABAD	Gujarat	33,917	5,788		184	5,153		3,688	3,957
AMRITSAR	Punjab	1,594	14,930	435		1,574	2,490	527	3,225
BANGALORE	Karnataka	61,204	112,261	4,707	1,140	13,851	1,405	46,062	4,363
BARAUT	Uttar Pradesh	528	1,367	97		208	58		
BHOPAL	Madhya Pradesh	909	9,954	1,280	2,012	1,803	2,169	4,237	1,688
BHUBANESHWAR	Odisha	2,603	15,980	1,185	403	2,492	1,570	2,259	475
CHANDIGARH	Punjab, Haryana	2,654	12,876	2,535	2,224	5,493	2,510	5,096	5,655
CHENNAI	Tamil Nadu		41,589	4,840		12,616	6,088	2,449	8,783
DEHRADUN	Uttarakhand	1,109	7,975	866	824	435	915	1,670	
DELHI	Delhi	453,741	66,200	34,507	23,230	59,050	129,654	54,453	41,544
GANGATOK	Sikkim	110	457	66	57	205		258	210
GUWAHATI	Assam	2,906	43,970	4,400		3,444	424	2,641	1,815
HYDERABAD	Telangana, AP	1,780	37,180	4,672	7,024	16,161	3,373	2,005	9,527
JAIPUR	Rajasthan	4,851	70,477	7,446	6,760	18,010	20,705	9,723	4,865
JAMMU	Kashmir	47,547	32,591	1,831		3,331	2,907	2,730	1,623
KOLKATA	West Bengal	34,592	34,840	28,011	7,027	24,327	17,422	32,278	16,007
LUCKNOW	Uttar Pradesh	4,480	34,945	4,788		4,147	1,497	4,594	2,122
MUMBAI	Maharashtra	953	7,642	11,462	9,624	13,225	149,093	43,389	22,230
NAGPUR	Maharashtra	4,906	12,187	4,339		5,618	25,100	27,426	5,243
NASIK	Maharashtra	598	5,826	1,900		341			
PATNA	Bihar	8,982	20,335	5,121		2,726	305	10,164	
PUNE	Maharashtra	160	9,794	5,650		13,251		8,485	9,475
RAIPUR	Chhattisgarh	1,775	10,834	3,349	281	696	1,752	2,824	1,573
RANCHI	Jharkhand	8,532	47,895	2,212		6,568	2,477	3,565	400
SHIMLA	Himachal Pradesh		3,039	324	665	972	209	395	
SRINAGAR	Jammu and Kashmir	7,221	24,856	406		425	4,038	7,925	234
SURAT	Gujarat	1,742	17,566	2,487		10,051	1,352	1,872	3,461
TRIVENDRUM	Kerala	7,956	6,890	72	378	732	3,153	197	2,658

Source: Indian Horticulture Database 2013

Table 3-11 shows the state-wise production volumes of major fruits in 2012/13, and Table 3-12 shows the annual amount of fruit arriving at major wholesale markets. The combination of these two tables enables one to understand to some extent the flow of fruit from production sites to consumption sites. The following parts of this section analyze that flow at commodity level.

a) Banana

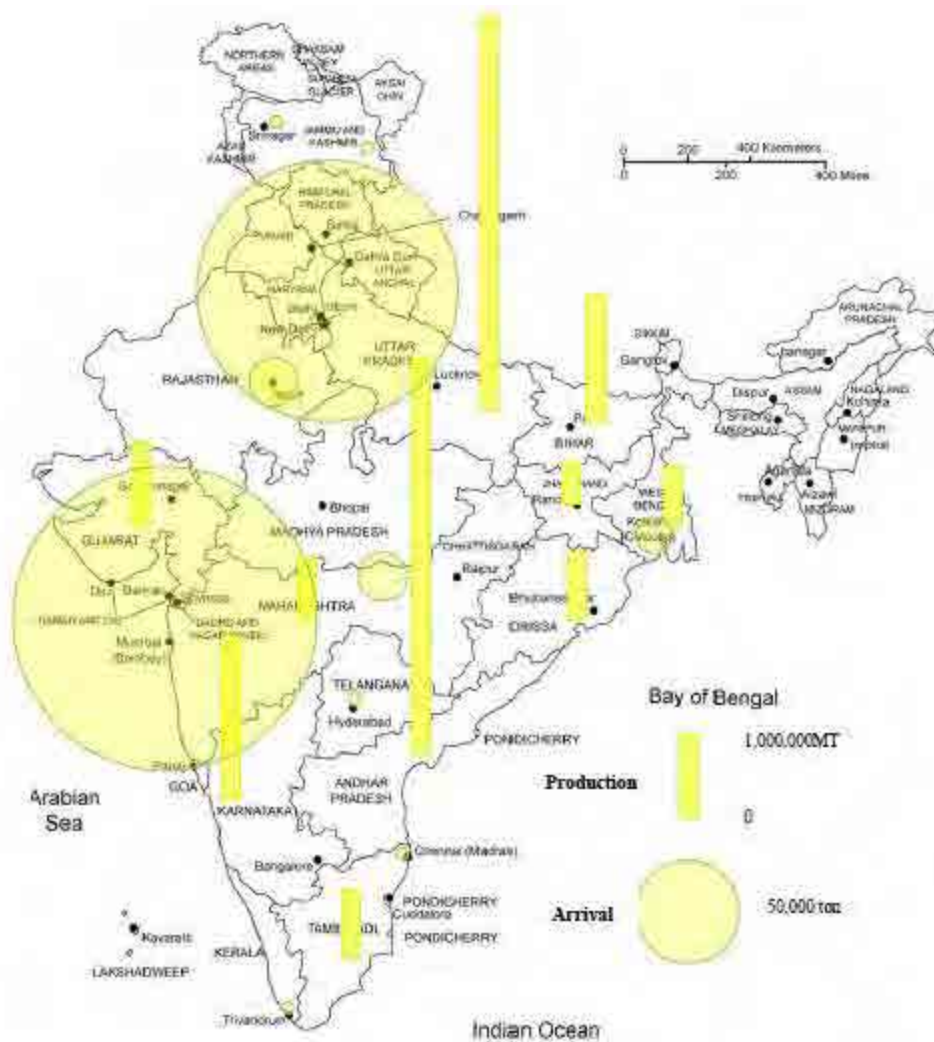


Source: Indian Horticulture Database 2013

Figure 3-5: Banana production in ten top states and arrivals in ten top markets

Figure 3-5 is a spatial representation of banana production in the ten biggest banana-producing states and the amount of arrivals in the top ten wholesale markets. It indicates that banana is primarily cultivated in the southern and western states such as Tamil Nadu, Gujarat, Maharashtra and AP. Yet some significant amounts are also produced in the central and eastern states such as Bihar, Madhya Pradesh and West Bengal. One can see that significant amounts of banana are distributed to wholesale markets all over the country, even those in Jammu and Kashmir where bananas are not cultivated very much.

b) Mango

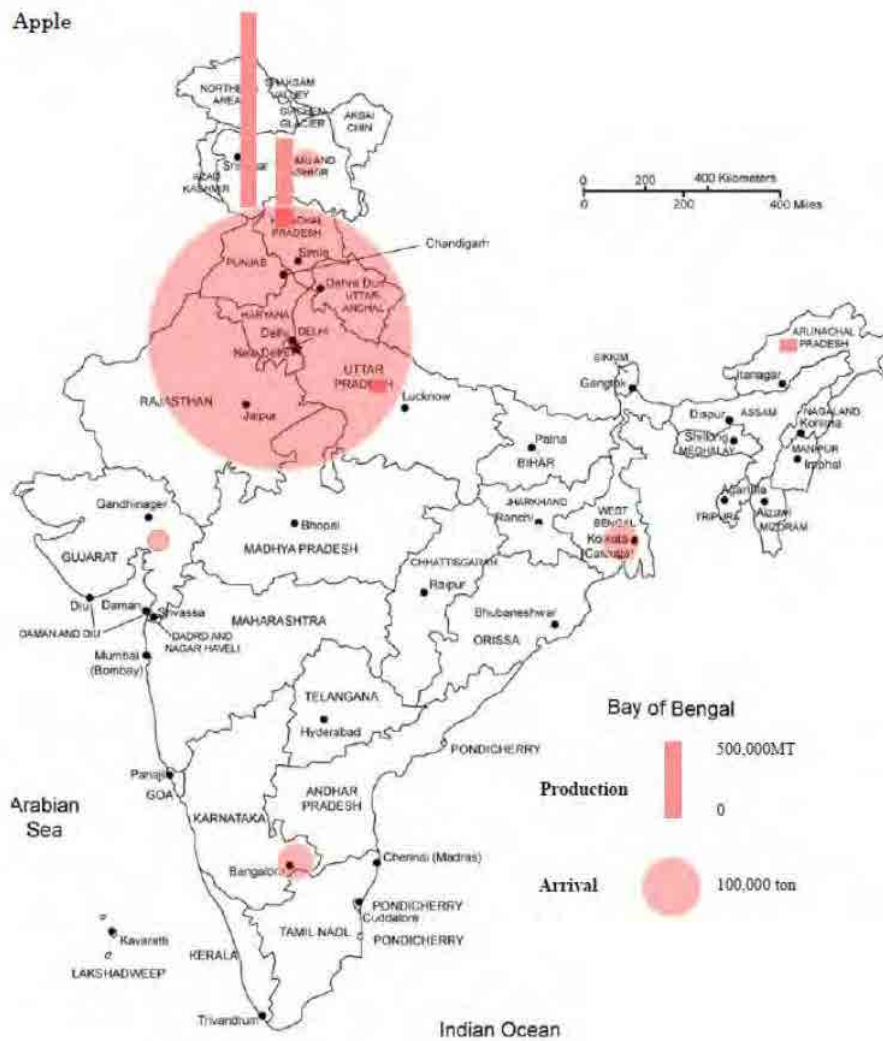


Source: Indian Horticulture Database 2013

Figure 3-6: Mango production in ten top states and arrivals in ten top markets

Figure 3-6 is a spatial representation of mango production in the ten biggest mango-producing states and the amount of arrivals at the top ten wholesale markets. The prime producing states for mango are Uttar Pradesh and AP. Its production in Karnataka, Bihar and Gujarat is also significant, suggesting its production is geographically dispersed. Figure 3-6 indicates, however, the concentration of mango to two wholesale markets in Mumbai and Delhi out of all the wholesale markets in the country.

c) Apple

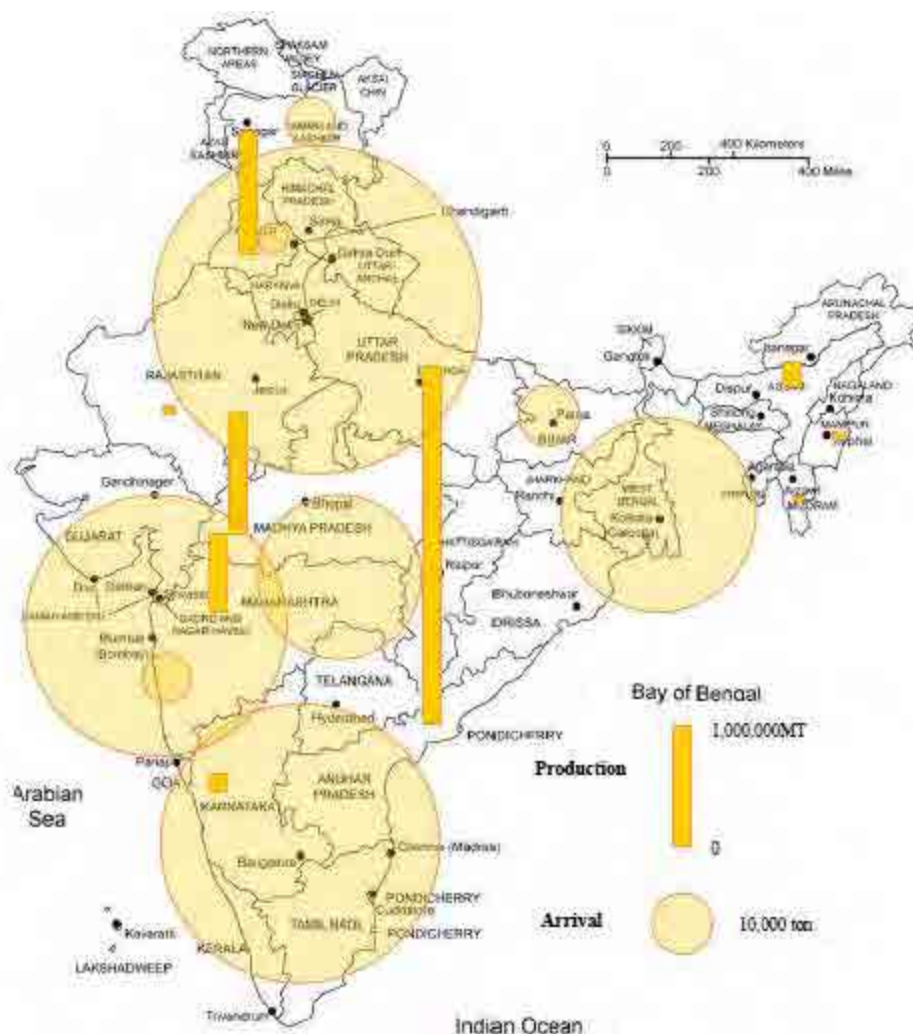


Source: Indian Horticulture Database 2013

Figure 3-7: Apple production in four top states and arrivals in five top markets

Figure 3-7 is a spatial representation of apple production in the four biggest apple-producing states and the amount of arrivals to the top five wholesale markets. It shows that apple is primarily cultivated in northern areas such as Jammu and Kashmir and Himachal Pradesh. The apples produced in the northern area are shipped all over India, of which significant amounts go to Delhi wholesale market.

d) Orange

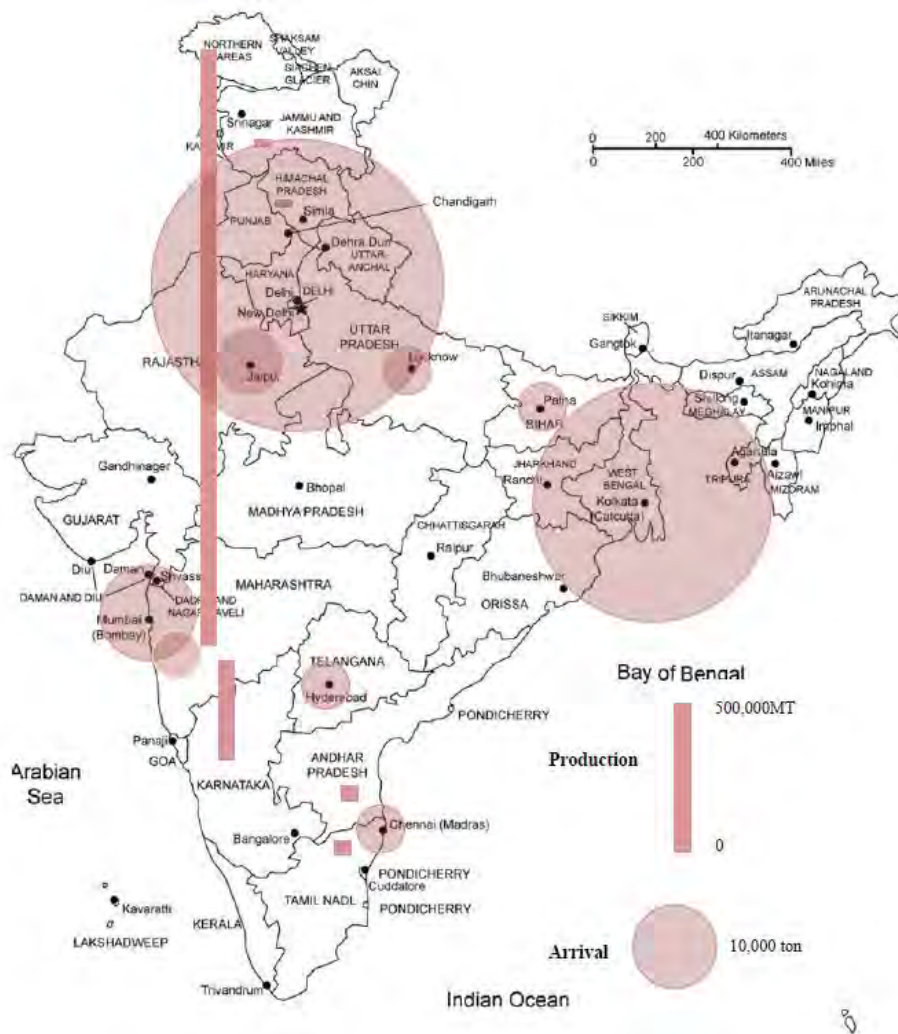


Source: Indian Horticulture Database 2013

Figure 3-8: Orange production in ten top states and arrivals in ten top markets

Figure 3-8 is a spatial representation of orange production in the ten biggest orange-producing states and the amounts of arrivals to the top ten wholesale markets. The main orange-producing states are AP, Punjab and Madhya Pradesh, yet non-negligible amounts are produced in Assam, Karnataka and Rajasthan. These oranges are shipped to many of the major wholesale markets over the country, such as Delhi, Bangalore, Mumbai, Kolkata and Nagpur.

e) Grapes

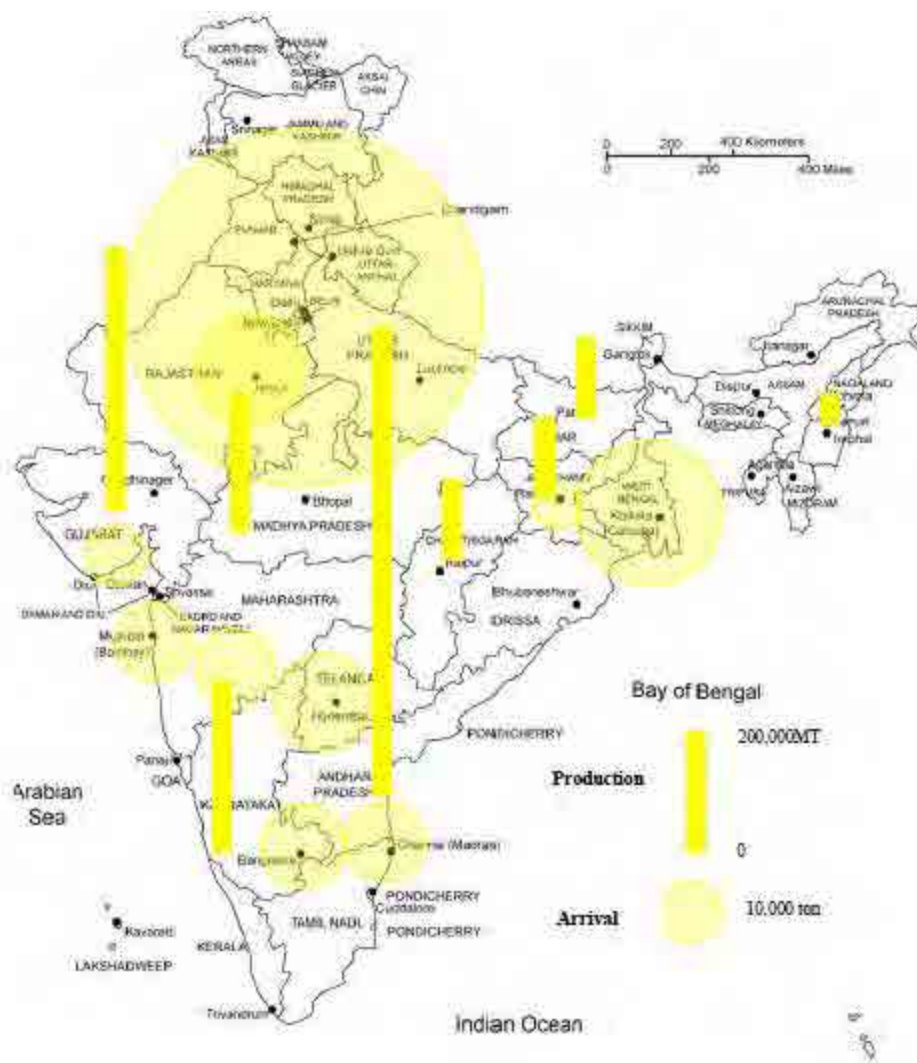


Source: Indian Horticulture Database 2013

Figure 3-9: Grape production in seven top states and arrivals in ten top markets

Figure 3-9 is a spatial representation of grape production in the seven biggest grape-producing states and the amount of arrivals to the top ten wholesale markets. It indicates that grapes are produced predominantly in Maharashtra, yet non-negligible amounts are produced in Karnataka. The grapes produced in these states are shipped to major wholesale markets all over India, and wholesale markets in Delhi and Kolkata are the two major destinations.

f) Lime/Lemon



Source: Indian Horticulture Database 2013

Figure 3-10: Lime/lemon production in ten top states and arrivals in ten top markets

Figure 3-10 is a spatial representation of lime/lemon production in the ten biggest lime/lemon-producing states and the amount of arrivals to the top ten wholesale markets. The major producing states of these products include AP, Gujarat, Karnataka and Madhya Pradesh. These products are shipped to the major wholesale markets all over India, such as Delhi, Kolkata, Hyderabad, Jaipur and Bangalore.

2) Vegetables

Table 3-13: State-wise production of major vegetables in 2013/14 (thousand tonnes)

STATES/UTs	BRINJAL	CABBAGE	CAULIFLOWER	OKRA	ONION	PEAS	POTATO	TOMATO
ANDAMAN NICOBAR	3.3	1.3	4.6	4.6				0.7
ANDHRA PRADESH	1,672.0	84.3	21.7	1,153.0	1,525.2	105.2	196.3	5,401.5
ARUNCHAL PRADESH		11.0	5.8					13.5
ASSAM	270.7	661.3	454.4	171.0	33.1	20.2	995.1	408.4
BIHAR	1,305.2	801.3	1,279.1	863.9	1,304.2	81.2	6,536.0	1,128.3
CHHATTISGARH	586.0	338.6	395.8	430.6	309.5		556.4	814.2
D & N HAVELI	2.2							1.8
DAMAN & DIU								
DELHI	16.9		36.6	14.1	43.8	75.6	15.7	14.2
GOA								
GUJARAT	1,341.1	663.5	532.3	723.3	1,817.0		2,300.0	1,156.7
HARYANA	460.2	232.0	493.8	278.2	774.2	106.0	712.8	767.1
HIMACHAL PRADESH	23.5	149.7	101.7	30.3	39.4	280.2	180.6	413.7
JAMMU & KASHMIR	45.2	73.2	85.3	43.0	65.3	58.1	127.2	88.1
JHARKHAND	272.5	471.3	363.4	447.4	320.5	359.3	653.1	251.4
KARNATAKA	438.3	216.2	86.3	85.0	1,674.7	24.2	730.2	1,997.1
KERALA							4.1	
LAKSHADWEEP	0.0					0.0		0.0
MADHYA PRADESH	1,067.0	578.3	703.8	305.9	2,825.6	561.0	2,322.0	1,937.3
MAHARASHTRA	777.0	693.0	792.0	230.0	5,867.0	21.0	387.0	1,050.0
MANIPUR		81.6	28.6	0.4	3.0	58.8	41.9	
MEGHALAYA	13.4	39.2	41.7		4.1	5.7	181.8	30.8
MIZORAM	16.5	43.3	1.7	22.4	4.7	2.2	3.0	8.3
NAGALAND	3.5	160.0	3.6	1.2	7.0	15.5	64.5	20.4
ODISHA	2,158.3	1,150.9	667.7	578.5	432.1	52.8	249.8	1,386.0
PUDUCHERRY	1.9			0.1	0.1			0.1
PUNJAB	84.8	86.9	217.0	33.2	184.5	209.0	2,180.0	177.1
RAJASTHAN	33.5	14.4	57.4	16.0	714.0	28.6	195.3	89.9
SIKKIM	1.6	7.5	4.3	7.1	1.6	9.0	48.8	8.6
TAMIL NADU	126.2	143.5	22.2	83.6	472.7		115.6	332.5
TRIPURA	53.0	77.0	51.0	16.0			150.0	39.0
UTTAR PRADESH	110.7	76.3	250.7	165.7	493.2	1,953.8	15,013.3	323.4
UTTARAKHAND	27.1	72.8	36.7	27.9	39.4	78.3	434.4	102.5
WEST BENGAL	2,977.0	2,197.4	1,879.0	877.0	342.9	133.5	12,000.0	1,141.5
<b>TOTAL</b>	<b>13,888.4</b>	<b>9,125.7</b>	<b>8,618.1</b>	<b>6,609.5</b>	<b>19,298.6</b>	<b>4,239.1</b>	<b>46,394.8</b>	<b>19,104.0</b>

Source: Indian Horticulture Database 2013

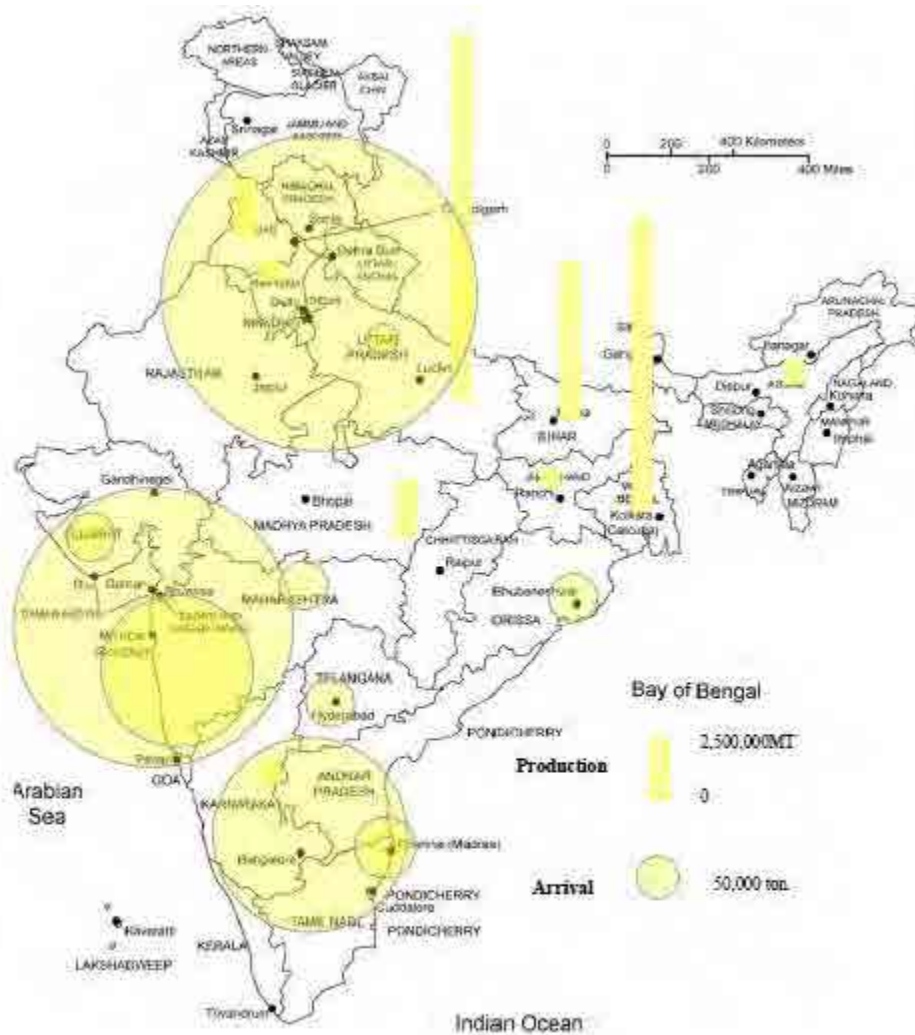
Table 3-14: Annual amount of arrivals of major vegetables to wholesale markets in 2013 (tonnes)

Market	State	BRINJAL	CABBAGE	CAULIFLO WER	OKRA	ONION	PEAS	POTATO	TOMATO
ABOHAR	Punjab	7,263	8,813	10,332	4,555	15,234	6,622	18,073	6,797
AGRA	Uttar Pradesh	4,991	4,153	2,774	3,094	40,491		37,865	3,021
AHMEDABAD	Gujarat	16,616	37,793	33,670	13,729	137,496	18,189	49,303	68,462
AMRITSAR	Punjab	2,317	3,638	7,421	878	30,620	5,554	17,121	8,522
BANGALORE	Karnataka	3,700	27,641	11,010	2,061	659,308	1,998	223,636	59,555
BARAUT	Uttar Pradesh	37	287	361	177	509	182	1,551	130
BHOPAL	Madhya Pradesh	4,760	7,363	7,017	4,512	24,431	4,010	16,607	34,917
BHUBANESHWAR	Odisha	1,908	14,880	4,119	923	49,821	2,231	46,180	13,593
CHANDIGARH	Punjab, Haryana	6,556	4,600	6,696	4,894	18,758	5,925	12,767	9,758
CHENNAI	Tamil Nadu	18,529	25,597	25,041	10,245	143,780		72,338	32,549
DEHRADUN	Uttarakhand	2,637	4,664	7,296	1,688	8,574	3,658	16,685	10,935
DELHI	Delhi	24,688	45,878	47,828	24,164	286,750	38,587	365,116	136,874
GANGATOK	Sikkim		4,825	715	241	850	278	617	886
GUWAHATI	Assam	4,384	21,894	5,744	2,187	31,191	1,701	30,544	6,295
HYDERABAD	Telangana, AP	6,168	34,471	15,122	12,368	67,892		45,975	7,097
JAIPUR	Rajasthan	5,182	2,572	3,614	2,971	94,526	5,312	25,333	37,924
JAMMU	Kashmir	1,930	8,379	11,153	1,738	21,142	5,420	14,830	18,337
KOLKATA	West Bengal	2,891	13,213	12,417	2,207	219,560	6,426	37,626	22,794
LASALGAON	Maharashtra					100,964			
LUCKNOW	Uttar Pradesh	3,219	7,160	11,987	2,229	7,795	8,685	12,722	6,963
MUMBAI	Maharashtra	13,832	41,325	37,089	31,316	229,742	52,183	323,138	69,386
NAGPUR	Maharashtra	16,140	16,640	12,433	2,441	57,050	1,717	55,920	17,440
NASIK	Maharashtra	4,727	11,320	10,608	313	50,861		25,233	10,803
PATNA	Bihar	4,419	10,581	10,366	2,792	17,133	2,812	10,163	6,049
PIMPALGAON	Maharashtra					90,932			13,897
PUNE	Maharashtra	11,042	11,108	10,773	5,476	243,399	11,500	178,193	12,022
RAIPUR	Chhattisgarh	0	2,331	1,401	474	11,000	1,199	9,544	3,983
RANCHI	Jharkhand	5,866	6,922	8,443	5,478	54,422	7,148	26,407	7,944
SHIMLA	Himachal Pradesh	917	4,294	3,299	901	3,736	7,239	14,583	2,917
SRINAGAR	Jammu and Kashmir	134	3,586	5,161		27,220	6,101	23,942	10,902
SURAT	Gujarat	17,833	20,850	15,606	16,667	66,370	5,517	30,323	69,668
TRIVENDRUM	Kerala	2,860	2,949	304	2,370	8,096		4,880	4,733

Source: Indian Horticulture Database 2013

Table 3-13 shows the state-wise production volume of major vegetables in 2013/14, and Table 3-14 shows the annual amount of vegetables arriving at major wholesale markets. The combination of these two tables enables one to understand to some extent the flow of vegetables from production sites to consumption sites. The following parts of this section analyze that flow at commodity level.

a) Potato

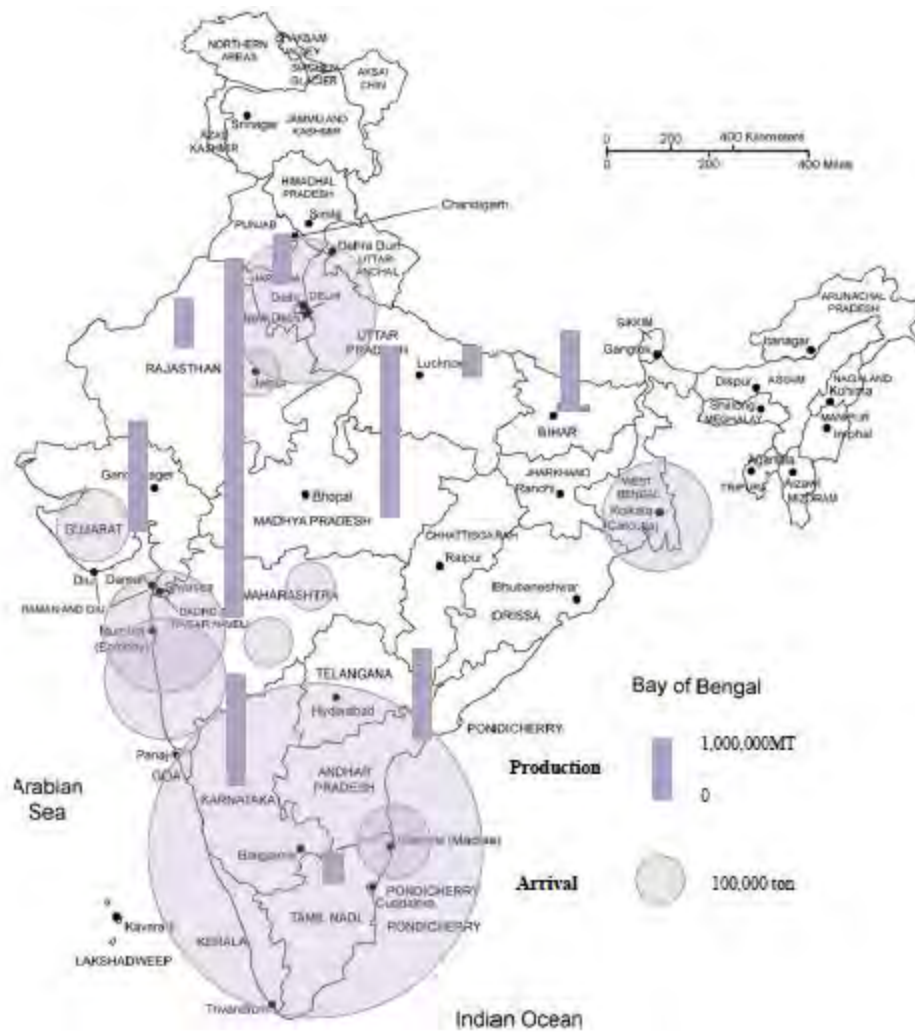


Source: Indian Horticulture Database 2013

Figure 3-11: Potato production in ten top states and arrivals in ten top markets

Figure 3-11 is a spatial representation of potato production in the ten biggest potato-producing states and the amount of arrivals at the top ten wholesale markets. It shows that potato is primarily cultivated in the north-eastern states of Uttar Pradesh, West Bengal and Bihar. Potato is also traded in many of the major wholesale markets, even in wholesale markets in Tamil Nadu, Maharashtra and Karnataka where very little potato is cultivated. This indicates that a large volume of potatoes is shipped to these southern areas from the potato-producing states in the north.

b) Onion

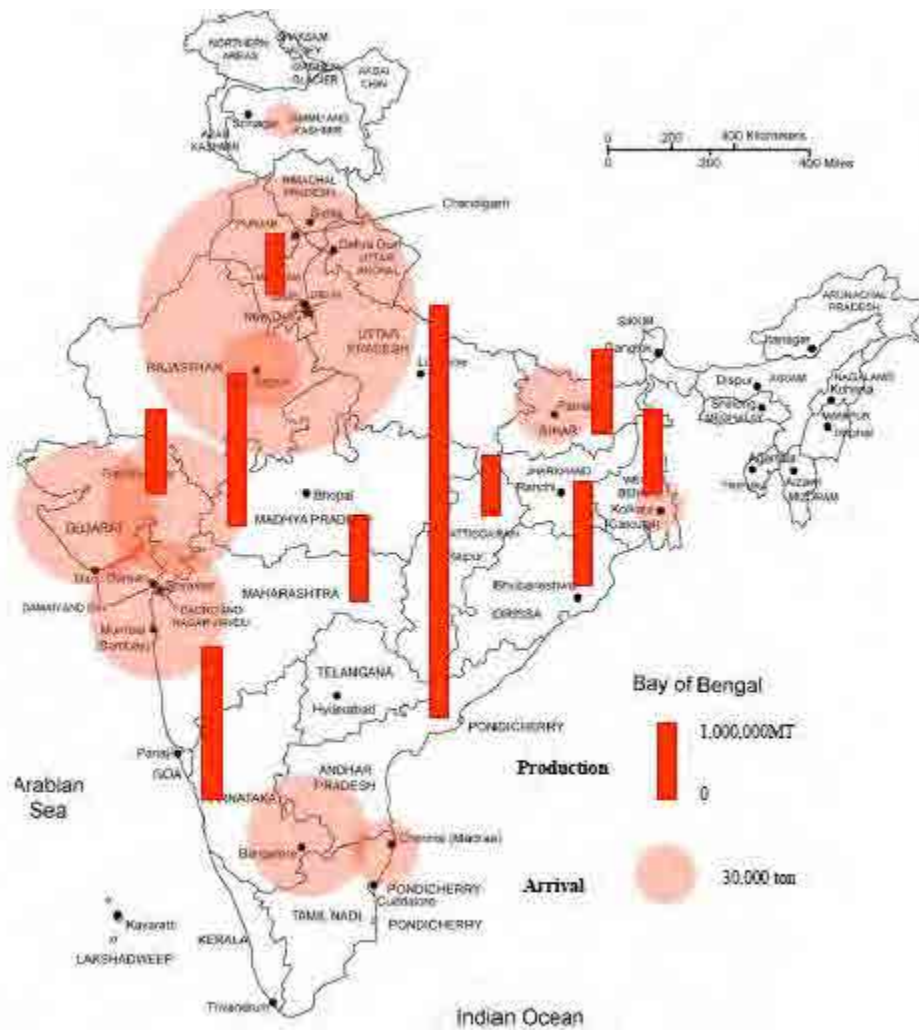


Source: Indian Horticulture Database 2013

Figure 3-12: Onion production in ten top states and arrivals in ten top markets

Figure 3-12 is a spatial representation of onion production in the ten biggest onion-producing states and the amount of arrivals at the top ten wholesale markets. It shows that onion is cultivated primarily in Maharashtra and Madhya Pradesh, and significant amounts are also cultivated in Gujarat, Karnataka, AP and Bihar. One can see that onions are shipped to major wholesale markets all over India, which include markets such as Delhi and Kolkata where onions are not produced in significant amounts in neighboring areas.

c) Tomato

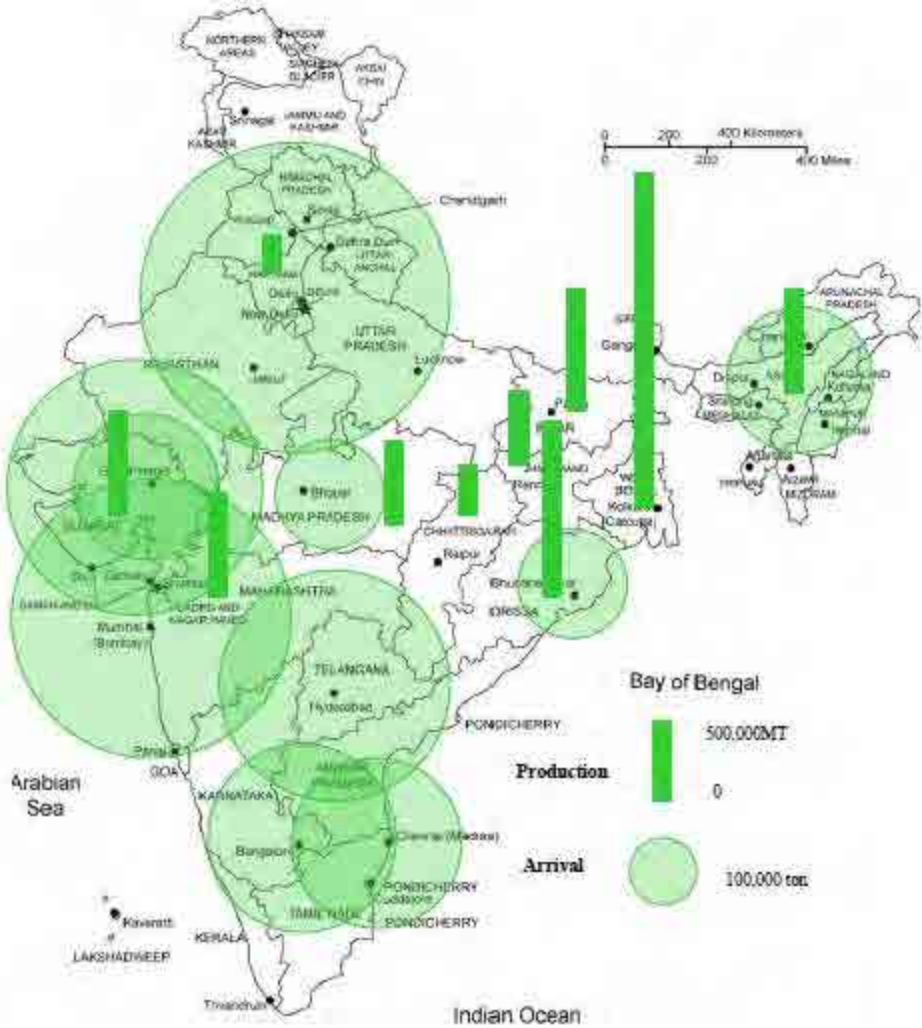


Source: Indian Horticulture Database 2013

Figure 3-13: Tomato production in ten top states and arrivals in ten top markets

Figure 3-13 is a spatial representation of tomato production in the ten biggest tomato-producing states and the amount of arrivals at the top ten wholesale markets. This shows that the prime tomato-producing state is AP, and other southern and central states such as Karnataka, Madhya Pradesh and Odisha also produce a significant amount. One can see that significant amounts of tomatoes are traded in northern regions such as Delhi, Gujarat and Mumbai, which indicates that a large amount of tomatoes are shipped to the north from the major producing areas in the south such as AP and Karnataka.

d) Cabbage

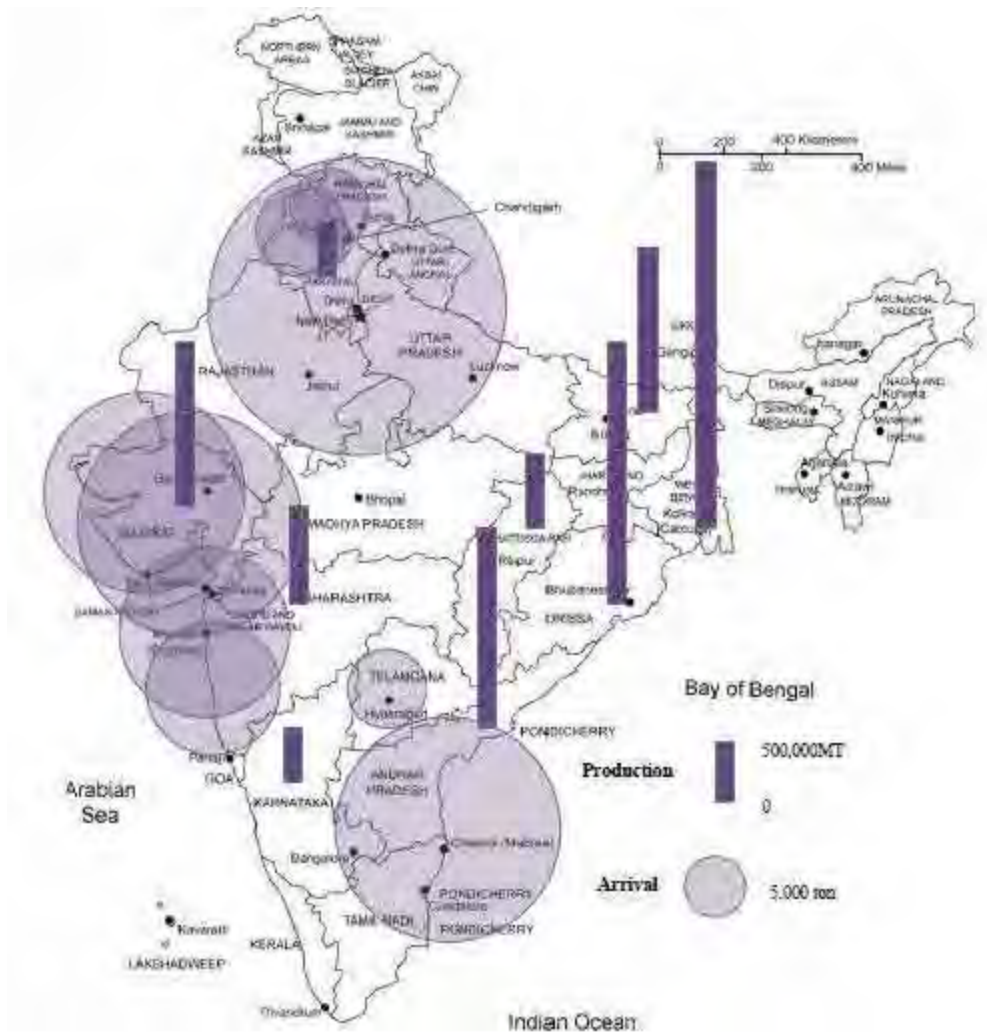


Source: Indian Horticulture Database 2013

Figure 3-14: Cabbage production in ten top states and arrivals in ten top markets

Figure 3-14 is a spatial representation of cabbage production in the ten biggest cabbage-producing states and the amount of arrivals at the top ten wholesale markets. This shows that states in the north-east like West Bengal, Odisha and Bihar are the major cabbage-producing states. It also shows that a large amount of cabbages are traded in the major wholesale markets all over India such as Delhi, Mumbai, Ahmedabad, Hyderabad, Bangalore and Chennai. This indicates that a large amount of cabbages are shipped to these markets from the major cabbage-producing areas.

e) Brinjal



Source: Indian Horticulture Database 2013

Figure 3-15: Brinjal production in ten top states and arrivals in ten top markets

Figure 3-15 is a spatial representation of brinjal production in the ten biggest brinjal-producing states and the amount of arrivals at the top ten wholesale markets. This shows that states in the north-east like West Bengal and Odisha are the major cabbage-producing states. It also shows that a large amount of cabbages are traded in major wholesale markets all over India such as Delhi, Chennai, Surat, Mumbai, Ahmedabad and Nagpur. This indicates that a large amount of cabbages are shipped to these markets from the major cabbage-producing areas.

### 3) Plantation crops

Table 3-15: State-wise production of plantation crops in 2013/14 (thousand tonnes)

STATES/UTs	ARECANUT	CASHEWNU	COCOA	COCONUT
ANDAMAN NICOBAR	5.88	0.38		89.45
ANDHRA PRADESH	0.36	100.42	4.90	1377.19
ARUNACHAL PRADESH				
ASSAM	72.58	0.56		111.36
BIHAR				96.85
CHHATTISGARH		10.37		15.21
D & N HAVELI				
DAMAN & DIU				
DELHI				
GOA	2.87	32.35		86.52
GUJARAT		24.52		221.88
HARYANA				
HIMACHAL PRADESH				
JAMMU & KASHMIR				
JHARKHAND		1.20		
KARNATAKA	358.61	80.61	3.63	4335.14
KERALA	118.23	83.12	7.45	3990.39
LAKSHADWEEP				48.80
MADHYA PRADESH				
MAHARASHTRA	3.58	242.61		129.02
MANIPUR				
MEGHALAYA	19.83	10.11		
MIZORAM	4.32			0.11
NAGALAND	0.12			11.20
ODISHA		85.71		492.00
PUDUCHERRY	0.08			15.83
PUNJAB				
RAJASTHAN				
SIKKIM				
TAMIL NADU	13.20	67.39	2.13	4760.67
TRIPURA	9.92	5.10		19.00
UTTAR PRADESH				
UTTARAKHAND				
WEST BENGAL	21.16	13.03		255.22
<b>TOTAL</b>	<b>630.74</b>	<b>757.48</b>	<b>18.10</b>	<b>16055.84</b>

Table 3-15 shows the state-wise production volume of plantation crops in 2012/13. One can see that production of coconut is predominant in plantation crops. Coconut is mainly produced in the southern states such as Karnataka, Kerala and Tamil Nadu.

**3.1.2 Current status of and bottlenecks in value chains**

**(1) Outline of value chains**

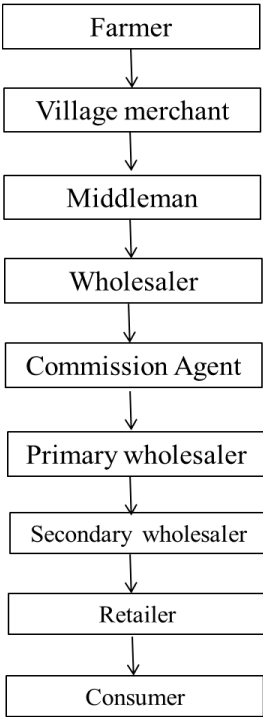
The supply chains for horticultural products in India are often portrayed with the dichotomy of two distinct chains - the unorganized retail sector and the organized retail sector.

**1) Unorganized retailing**

**a) Overview**

**i) Fruit and vegetables**

Unorganized retailers of fruit and vegetables are all small-scale, and include Kirana stores, fruit and vegetable or product-specific outlets and vendors, and stalls on the streets. There are about 1.4 million of these unorganized retailers covering a retail value of USD249 billion.<sup>13</sup> The supply chains and logistics to supply these unorganized retail shops are characterized by high complexity with multiple layers of intermediaries. Figure 3-16 depicts a typical flow of fruit and vegetables from producer to consumer in the unorganized distribution system.



Source: Study team

Figure 3-16: Product flow of unorganized retailing

<sup>13</sup> This figure is based on the forecast by Ernest &Young in *Flavors of Incredible India*.

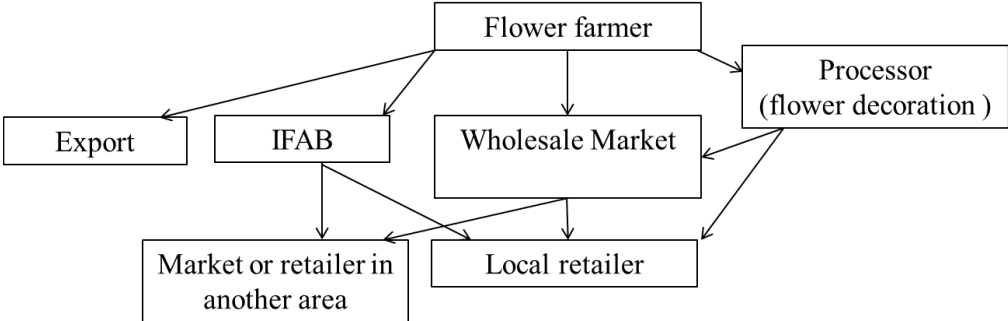
Farmers in India typically produce small amounts of different vegetables and fruit on their small farms. Their farms are scattered over wide areas. Village merchants collect the various products from neighboring farmers within their villages, then sell these to middlemen who travel to the villages. The middlemen sell the products to various wholesalers who usually deal with large quantities of selected products. Typically the grading and packing are done by wholesalers at their own premises or at wholesale markets.<sup>14</sup>

The wholesalers then bring these products to the wholesale markets, which are managed by APMCs. At the wholesale markets these products are put into auctions, where registered commission agents manage the trade. The buyers at wholesale markets are typically wholesalers who deliver the products to retailers.<sup>15</sup>

The traditional unorganized retail stores work well for the everyday lives of most consumers. The consumers who shop at these retail stores check the quality of products with their own eyes, and buy small quantities of products they need on a daily basis.

There are virtually no quality or hygiene standards throughout the flow of the unorganized supply chain system. Many of the wholesale and retail outlets are located in open spaces, and thus there is a degree of risk on food safety. There is also no mechanism to ensure the traceability of food products in this system.

ii) Flowers



Source: Study team

Figure 3-17: Product flow for flowers (in Bangalore)

Figure 3-17 shows the flow for flower distribution, represented by that of roses in Bangalore. Greenhouse production of flowers is a relatively new phenomenon in Indian agriculture. Rose production in

<sup>14</sup> There is actually no clear definition for the names of these intermediaries. The names of intermediary agents used here such as village merchant, middlemen, and wholesaler are based on the usage suggested by *Value Chains and Retailing of Fresh Vegetables and Fruits, Andhra Pradesh*, by G.P. Reddy, M.R.K. Murthy and P.C. Meena.

<sup>15</sup> Of course some proportion of products bypass some of these intermediaries, e.g. some farmers or village merchants who can access wholesale markets bring their products to wholesale markets directly.

Bangalore started in 1995 as a joint venture of local and Dutch flower producers<sup>16</sup>. As the demand for flowers in India has increased rapidly, there have been a significant number of new entrants to the flower production business; in the case of Bangalore there are currently about 200 flower greenhouses. The majority of flower farms are relatively small-scale with less than 3 hectare of production area, and these small flower farmers typically do not have their own packing and grading facilities or cold storage. On the other hand, larger flower farmers do usually own these facilities. Most of the flowers produced are shipped to wholesale markets, from where they are, in turn, delivered all over India. The major destinations of roses produced in Bangalore are Hyderabad, Chennai, Delhi and Calcutta.

In the case of Bangalore, some of the flowers produced are delivered to the organized auction centre, the International Flower Auction Bangalore (IFAB), from where they are also delivered all over India. Some larger flower farmers in Bangalore export their products directly to importers. The major destinations are Holland and other European countries. Some proportion goes to Japan and Australia.

In many cases flowers are sold as decorations. There are many (usually small or marginal scale) processors who buy flowers from flower farmers and process them into decorations. They usually sell these flower decorations to wholesale markets, but sometimes bring them to retailers directly.

## **b) Post-harvest**

Most of the grading and packing work is done by middlemen or wholesalers. At wholesale markets one can see traders doing various works such as uploading, grading, and repacking of the products they deliver to the markets.

## **c) Problems/issues**

The high complexity of the traditional unorganized supply chain system in India, with its multiple layers of intermediaries, is a result of the following production and distribution system.

- Farmers typically produce small quantities of various horticultural products at scattered locations.
- The lack of quality standards, non-availability of storage and grading facilities in rural areas, and the scale of production, make it difficult for farmers to do post-harvest activities such as storing, grading and packing.
- Infrastructure of transportation is limited in rural areas.

This system can be described as quite efficient and sophisticated in the way that it ensures swift and

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<sup>16</sup> The data and information in this paragraph are based on the interview with the management of International Flower Auction, Bangalore.

timely delivery of food products to consumers, who usually buy small quantities at a time and are very price-sensitive. It also creates a lot of employment in both rural and urban areas.

There are, however, a number of issues/problems with the traditional supply chains identified in the existing literature.

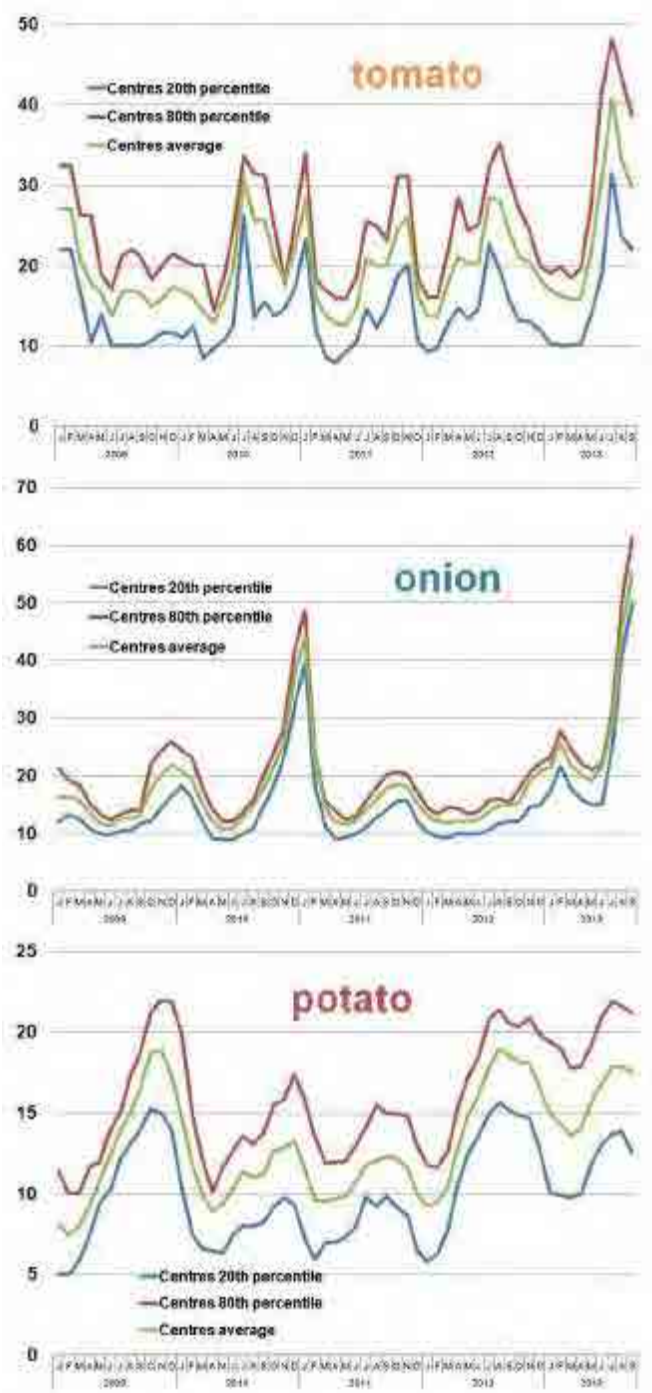
- The realization of value addition to the farmer is kept low due to their lack of bargaining power and the large number of intermediaries. Also, the fact that consumers are highly price-sensitive and largely driven by consideration of price rather than quality makes it difficult to gain high margins for both farmers and intermediaries.
- The complexity in the supply chain, combined with the lack of cold chains, results in a high percentage of wastage for fruit and vegetables as shown in Table 3-16.

Table 3-16: Post-harvest losses by crop (2009)

Crop	Cumulative wastage (%)
Cereals	3.9-6.0
Pulses	4.3-6.1
Oil seeds	6.0
Fruit and vegetables	5.8-18.0
Milk	0.8
Fisheries	2.9-6.9
Meat	2.3
Poultry	3.7

Source: MOFPI

- The traditional system of supply chain does not provide incentives for quality.
- Agricultural Acts put restrictions on the participation of private players as buyers, and hence private players have limited opportunities to purchase directly from farmers.
- One can see the high extent of price volatility for tomato and to some extent for onion in Figure 3-18. The price volatility directly affects the household economy of consumers and marginal farmers who are most involved in cultivation of these products. It also makes it difficult for processing firms which use these products as raw material to ensure a stable supply of them.



Source: <https://makanaka.wordpress.com/tag/tomato/>

Figure 3-18: Price fluctuations for tomato, onion and potato

**d) Counter-measures for these issues/problems**

There are some measures that aim to overcome these problems, including the following.

- Safal fruit and vegetable auction market, Bangalore

Safal is aiming to establish an alternative market structure which provides an incentive for quality and

productivity, and thereby improves the income of farmers. The project comprises the establishment of a Dutch auction market system, with farmer associations as backward linkages, and cash and carry retail stores as forward linkages.

For the formation of farmer associations, Safal has established a mechanism whereby farmers themselves collectively grade and pack products such as mango, banana and tomato. The packed products are delivered to collection centers and then to the storage or processing plants of Safal. This mechanism ensures a stable income for farmers, and also a stable supply of raw materials for Safal.

The Dutch auction system that Safal established, however, has not been working on a large scale so far. The traders generally do not find it worth their while to trade at the auction center, and continue to work at the traditional wholesale markets.

- International Flower Auction Bangalore

This is the only organized flower wholesale market which has adopted the Dutch auction system. The center is managed by a joint venture company with public and private shareholders. There are fifty registered buyers and sixty sellers. The member flower producers of this auction center are mostly small- and medium-scale producers. Large-scale producers tend to sell at traditional markets where the scales are much larger, and large producers export their products by themselves.

On average 150,000 stems of flowers are traded daily, and the value of trade per day is INR300,000-500,000<sup>17</sup>.

- ICRISAT’s Agri-Business incubation program

This program was launched in 2003, and aims to promote agricultural technologies developed by ICRISAT and other R & D centers. The service strategy of the program focuses on business development in five strategic areas. The outreach strategy involves collaborative business incubation to bring a wider range of expertise and resources to bear on business development to foster agricultural development in other regions.

- Farmer-private enterprise partnerships

Table 3-17 shows some models and examples of farmer-private enterprise partnerships.

Table 3-17: Examples of farmer-private enterprise partnerships

Model	Examples
Lead farmer model	ITC’s e-choupals (Sanchalak), IDEI’s IPMAS (nursery entrepreneur), PRADAN’s Agriculture Production Clusters (community service providers)
Producer companies co-capitalized by private venture funds	Zameen

<sup>17</sup> These figures are based on the interview with the management of International Flower Auction, Bangalore.

Model	Examples
Co-create value chain through joint stake company	Community Companies of Fab India, Eco Tasar Private Ltd, Divine Chocolate, Nshili Tea Corporation

Source: Report of the working group on agricultural marketing infrastructure

- Cooperative farming

One aim of forming cooperatives is to bring all the land resources of farmers together in an organized and united way, so that they will collectively be in a position to grow crops on every bit of land, making the best use of the land's fertility. This system has become an essential feature of India's Five Year Plan.

There are several public and private institutions that promote and facilitate cooperative farming in India, including the National Co-operative Development Corporation (NCDC), the Indian Farmers Fertilizer Co-operative Limited (IFFCO), and the National Agricultural Cooperative Marketing Federation of India Ltd (NAFED).

The progress of cooperative farming in India has been very slow. The reasons include fear of unemployment, attachment to land, lack of proper propaganda, farmers giving up their membership and the existence of fake societies.

- The promotion of FPOs by SFAC (see 2.3.1).

FPOs are formed to enhance the bargaining power of small farmers by shipping their products collectively. Each FPO has its own cold storage. There are now about 400 FPOs in India, and on average 100 member farmers in each FPO. SFAC also provides equity grant to FPOs<sup>18</sup>.

- APMC reform (see 2.1.2 (1)).

- Alternative/innovative markets

There are several measures to create direct links between producers and consumers bypassing some or all of the intermediaries in the supply chains. Table 3-18 below shows some examples.

Table 3-18: Examples of alternative markets that provide direct links between producers and consumers

State	Name of Market	Description
Tamil Nadu	Uzhavar Sandhai	Provides direct selling of fruit and vegetables by farmers to consumers at a fair price without any intermediaries
AP	Rythu bazaars	Provides direct links between farmers and consumers in the marketing of fruit, vegetables and essential food items
Punjab	Apni Mandi	Provides direct contact for sale of the produce between farmers and ultimate consumers

<sup>18</sup> The figures are based on the interview with the officers at SFAC.

State	Name of Market	Description
Odisha	Krushak Bazaars	There are no commission agents/traders operating in these markets
Delhi	Kisan Mandi	Delhi APMC was amended in 2014 to allow any institution, other than APMC, to set up wholesale markets for horticulture products. Accordingly, SFAC has been contracting a Kisan mandi in Delhi where FPOs can sell their produce directly to the 200 registered buyers. FPOs do not actually deliver their produce to the Mandi, but just display a sample. After an agreement has been concluded, FPOs deliver the produce to buyers from their cold storage.

Source: Study team

- Price stabilization fund for agricultural and horticultural products (see 2.1.1)
- Contract and contact farming

The difference between contract and contact farming is as follows.

Contract farming:

This can be defined as an arrangement for production and supply of agricultural products by farmers under advance contracts; these arrangements include the commitment to provide an agricultural commodity of a certain type at a specified time, price and quantity to a known buyer.

Contact farming:

This refers to having registered farmers without any commitment to buy or sell or a pre-agreed price or quantity.

Contract and contact farming are relatively new exercises in the Indian agriculture sector; they have been expanding recently albeit slowly. Expansion of contact and contract farming will simplify the current complex supply chains for horticulture products, and is likely to provide a source of more stable income for farmers.

## 2) Organized retailing

### a) Overview

Organized modern retailing shops are relatively new in the Indian food retail sector, where traditional unorganized retail outlets have dominated. Organized retailers include supermarkets, convenience stores, hypermarkets, and cash and carry shops. Even though organized retailers have been expanding recently, there are only about 1,000 consumer touchpoints with a retailed value of USD17.6 billion<sup>19</sup>.

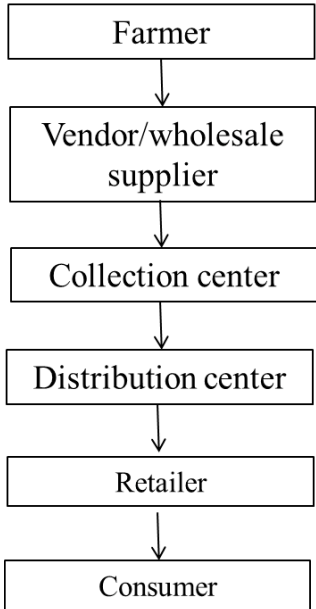
There are several large international retailers, such as Metro, Carrefour, Tesco and Wal-Mart, which have also been expanding their presence in the Indian retail market even though there is a regulation

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<sup>19</sup> These figures are based on “Flavours of Incredible India”, Ernst and Young.

requiring them to tie up with a local partner for their Indian operations.  
 Supply chains of fresh horticultural products.

i) Supply chains



Source: Study team

Figure 3-19: Product flow of organized retailing

Figure 3-19 shows the typical product flow for fruit and vegetables in the case of organized retailers. For stable procurement in many cases organized retailers procure fresh horticultural products from farmers directly in the form of contract farming, rather than relying on the fragmented traditional unorganized supply chain system. There are few cases of contract farming with modern retailers in India. Table 3-19 shows some recent examples of contract and contact farming, and indicates that the buyers for these contract and contact farmers are organized modern retailers or processors (which are described in later sections).

Table 3-19: Examples of contract/contact farming<sup>20</sup>

Buyers	Location	Crop under contract/ purchased	Average size (in acres) of contract/contact grower holding (operational)
ITC’s Choupal Fresh	Chandigarh region (Punjab/Haryana)	Cauliflower, bottlegourd	9.91
Reliance Fresh (RF)	Ahmedabad region	Cauliflower, cabbage	15.9

<sup>20</sup> The list of companies which offer contract farming is available at the site of AGMARTNET (<http://agmarknet.nic.in/ConFarm1.htm>).

Buyers	Location	Crop under contract/ purchased	Average size (in acres) of contract/contact grower holding (operational)
ABRL's More	Ahmedabad region	Cauliflower, tomato	15.43
ABRL's More	Bangalore region	Cauliflower, tomato	7.52
RF/ABR's More (through supplier)	Belgaum region	Cauliflower, tomato	16.97
Namdhari – Fresh	Bangalore region	Okra, baby corn	4.56
Frito Lay (Pepsi)	Punjab	Potato	53
Nijjer Agro	Punjab	Tomato	22
Frito Lay (Pepsi)	Punjab	Chili	90
BHC Agro India	AP	Gherkin	7
AP Govt. and various processors	AP	Oil palm	10
A M Todd	Punjab	Mint	57
Many MNCs and local firms in Punjab	Punjab	Many crops together	37
McCain Foods	Gujarat	Potato	19
Frito Lay (Pepsi)	Punjab	Potato	63
A M Todd	Punjab	Mint	40
Frito Lay, (Pepsi)	Punjab	Potato	75
AVT McCormick	Karnataka, AP	Chili	35 (Karnataka)

*Source: Contact Farming for Agricultural Development in India, Sukhpal Singh*

Some studies claim that contract farmers face many problems such as undue quality cut on produce by firms or on-procurement of produce, delayed deliveries at the factory, delayed payment, low price, poor quality inputs, and pest attacks on the contract crop which led to crop failure or raised the cost of production. Also, defaults by farmers as well as buyers have been reported repeatedly. Trust needs to be generated between farmers and buyers to achieve success in contract farming.

These exercises of contract and contact farming are more prevalent for locally-grown vegetables and less for popular fruit such as banana, apple and mango, which modern retailers often procure from large-scale traders.

The organized modern retailers usually establish their own collection points and distribution centers. The typical flow of horticultural products is depicted in Figure 3-19, and is much less complicated than for unorganized retailers.

### 3) Infrastructure

#### a) Transportation

Generally speaking, the transportation system of local roads is underdeveloped and there appear to be

problems with safety and efficiency, while the highways are generally well-maintained.

Most of the highways have four or five traffic lanes in one side and road conditions are well maintained. This provides a good network for inter-city transportation, and will be extended further in the future.

On the other hand, the condition of local roads is quite poor. Commercial vehicles are compelled to travel on congested roads that are filled with pedestrians, motorcycles, cars and animals. The volume of traffic of local roads seems to have reached capacity. Trucks that deliver meat for export avoid the daytime rush hours and travel during the night.

It is interesting to note that in this environment a large logistics firm, Snowman, has been successful in providing logistics services all over India using various sizes of trucks.

## b) Storage and cold chains

Table 3-20 Trend in cold storage installed capacity

Year	Number of storage units	Installed capacity (thousand tonnes)
2004	4,748	19,552
2007	5,316	23,334
2009	5,381	24,450
2010	5,837	26,903
2011	6,156	28,681
2012	6,284	29,305

Source: Department of Agriculture

Table 3-21: Commodity-wise breakdown of storage (as at December 2009)

Commodity	Capacity (thousand tonnes)	% of total	Number of cold storage units
Potatoes	18,426.30	75.4	2,862
Multi-purpose	5,644.30	23.1	1,584
Fruit & vegetables	96.4	0.4	160
Meat and fish	188.5	0.8	497
Milk/milk products	68.2	0.3	191
Others	26.5	0.1	87
Total	24,450		5,381

Source: Department of Agriculture

There has been a significant increase in the number of cold storage units and their total capacity in the last ten years, as shown in Table 3-20. However a large proportion of these cold storage units are for products with a long shelf life, such as potato and chili. The storage capacity for other fruit and vegetables

which have a shorter shelf life is quite limited, as shown in Table 3-21.

Also, many claim that storage facilities are not usually available in rural areas. Although refrigerators are available at many large wholesale markets, these are typically used to store commercial crops (such as apple), waiting for a price increase, rather than to keep easily-perishable products fresh.

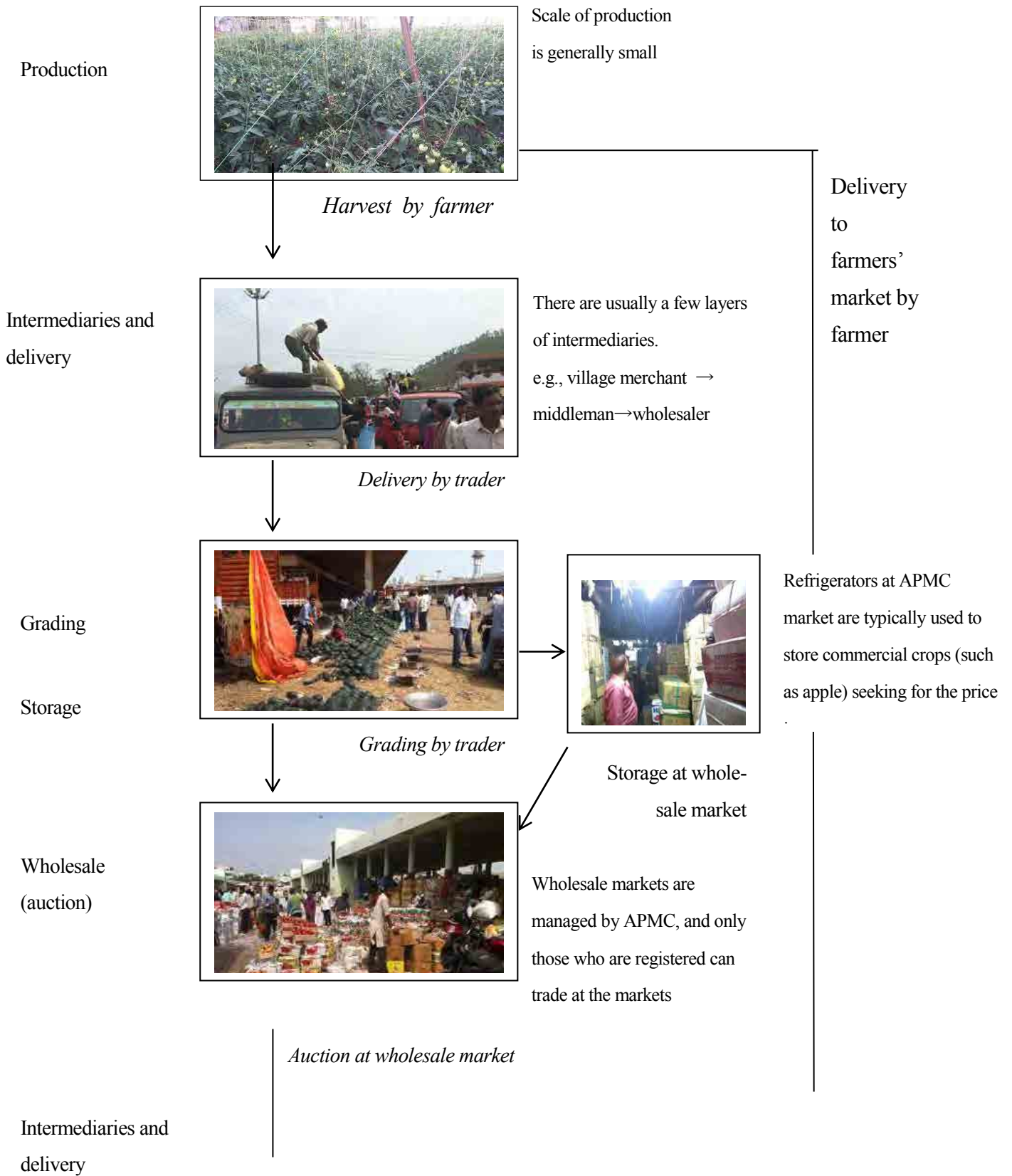
There are a number of processing firms and warehouses which have their own cold storage. There are, however, problems with a stable supply of electricity, which is essential for keeping a fixed temperature. Large logistics firms like Snowman have their own generators at all their facilities, yet it is too costly for small firms to have their own generators.

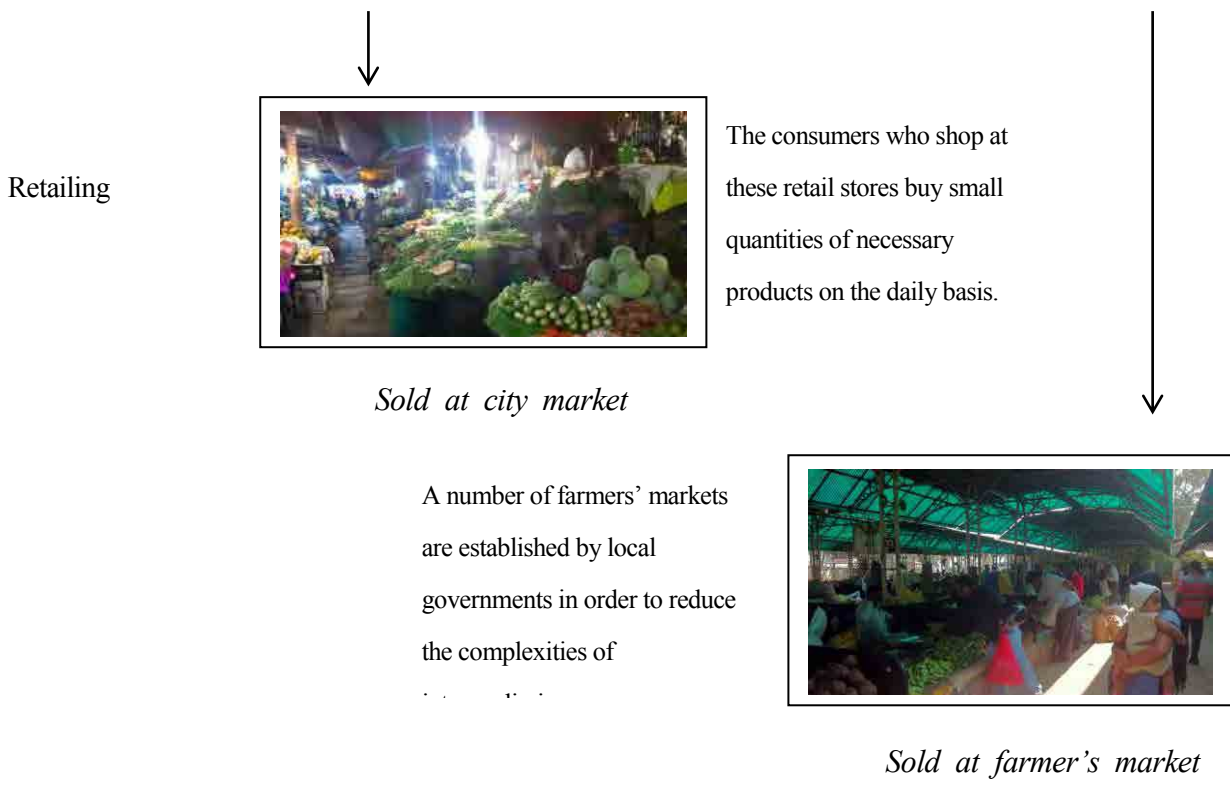
The logistics service firms typically deal with high-value food products such as frozen food, chocolate, ice cream and medical products, and do not generally handle fresh vegetables or fruit as cold-storing these products is not profitable.

In Snowman's warehouses commodities are stored in five-step racks, and each shelf is managed by address. They have enough equipment such as forklifts and material-handling equipment for stock and shipping. Computerization of the inventory and stock control has not yet been developed.

## **(2) Value chains at a glance**

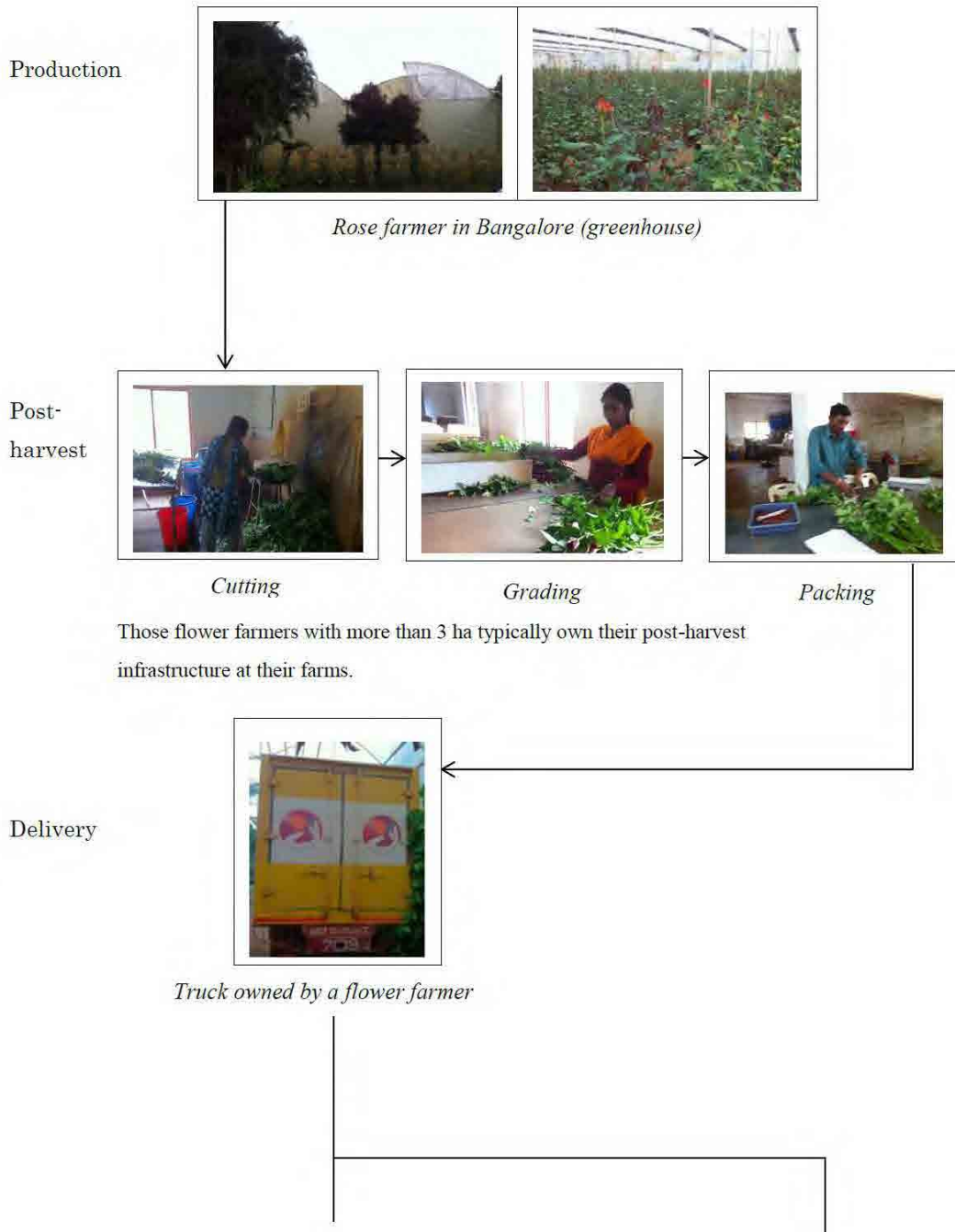
Figure 3-20 and 3-21 respectively show the supply chains for fruit and vegetables (for unorganized retailers) and flowers (for roses in Bangalore).

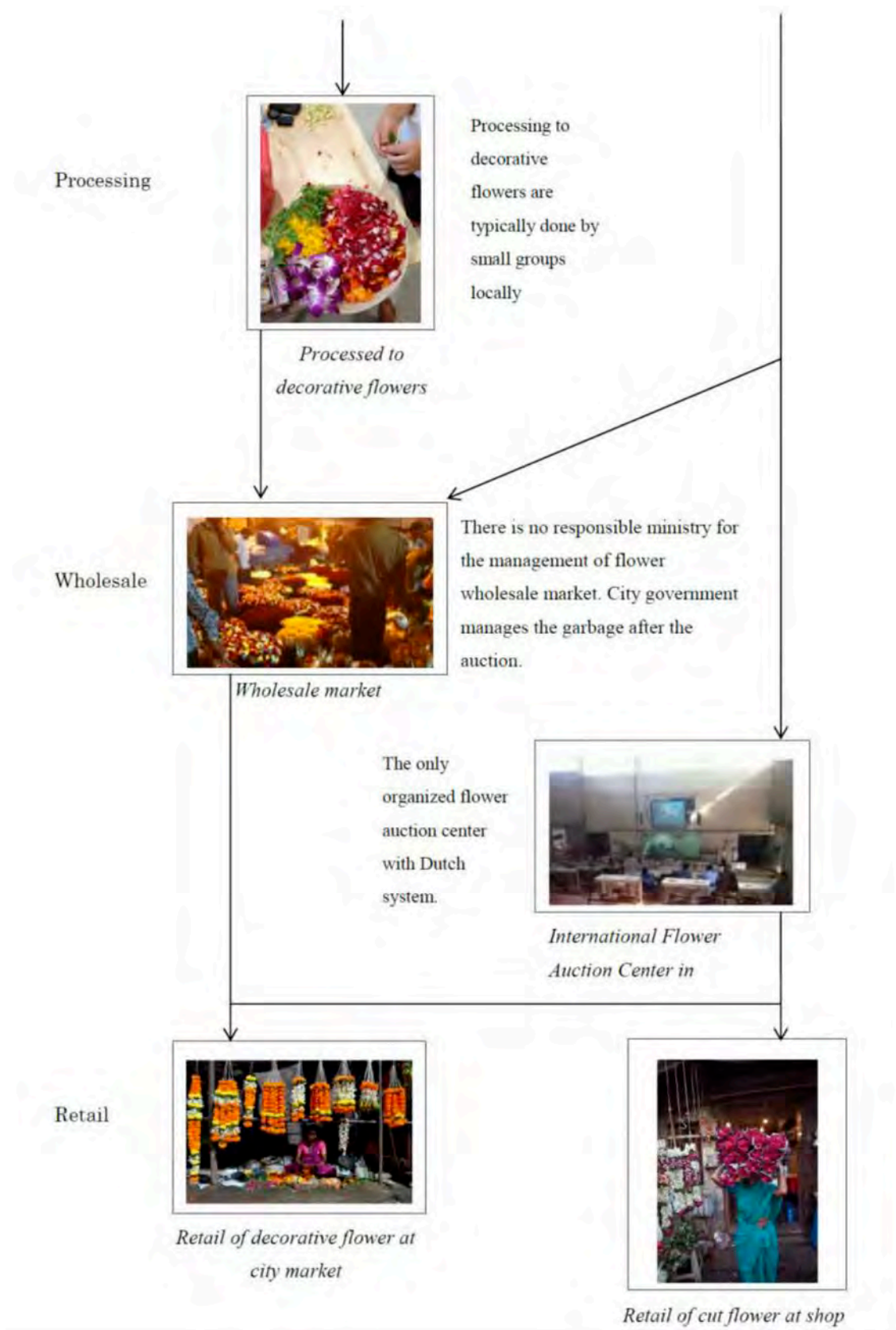




Source and photos: Study team

Figure 3-20: Value chain for vegetables and fruit (case of unorganized retailers)





Source and photos: Study team

Figure 3-21: Supply chain for flowers (represented by roses in Bangalore)

### (3) Stakeholder analysis

Tables 3-22 and 3-23 respectively summarize the problems/issues, activities and related government ministries of major stakeholders in the value chains of vegetables/fruit and flowers.

Table 3-22: Summary of problems, activities, and related government ministry for major stakeholders in the value chain of vegetables and fruit

Stakeholder	Major activities	Problems/issues	Related organization
Farmer	Production Some farmers engage in grading and packing activities. Few farmers bring their products directly to farmers' market or wholesale market.	<ul style="list-style-type: none"> <li>● The scale of production is typically small. Establishment of farmers' cooperative ameliorates this problem. Yet the progress of cooperative farming is slow, for fear of unemployment, attachment to land, lack of proper propaganda, renunciation of membership by farmers and existence of fake societies</li> <li>● Access to credit in rural areas is limited. This is especially true for marginal farmers.</li> <li>● This hinders the investment in technology and higher yielding input. Sometimes middlemen provide funds as an advance payment for the agricultural products they buy at harvesting season, which makes the farmers dependent on the middleman.</li> <li>● Limited availability of grading and packing infrastructure in rural areas which hinders farmers engaging in high value-added activities</li> <li>● Availability of roads not adequate in rural areas, which limits market access for farmers.</li> <li>● The price volatility of some products like tomato and onion directly affects the household economies of marginal farmers who are mostly involved in cultivation of these products.</li> </ul>	Department of Agriculture
Middleman/ unorganized trader	Intermediary and delivery	<ul style="list-style-type: none"> <li>● For small-size middleman access to credit is limited. They are typically dependent on private moneylenders for daily transactions, and have to pay a high interest rate.</li> </ul>	
Wholesaler	Intermediary and delivery	<ul style="list-style-type: none"> <li>● Lack of storage and cold storage. Improper handling leads to high wastage in</li> </ul>	APMC

Stakeholder	Major activities	Problems/issues	Related organization
	Often engage in grading and packing Seller at wholesale market	transportation and intermediary stages.	
Commission agent	Intermediaries at wholesale market	<ul style="list-style-type: none"> <li>● Only registered commission agents can work as auctioneer in wholesale markets. New entry to this job is difficult.</li> </ul>	APMC
Unorganized retailer	Retailing	<ul style="list-style-type: none"> <li>● The fact that most farmers are small-scale hinders the stable procurement of fresh horticultural products on a large scale.</li> <li>● Contract farming has not spread widely in India. Default on contracts by farmers as well as buyers have been repeatedly reported.</li> </ul>	
Processor	Processing	<ul style="list-style-type: none"> <li>● Due to the lack of timely credit availability, small processors often cannot meet their working capital requirements; they can only purchase less amount of raw material and therefore produce less.</li> <li>● Most processors cannot create their own infrastructure for logistics and rely heavily on common facilities. This hinders the timely procurement of raw material.</li> <li>● The seasonality of horticultural products as raw material makes it necessary for firms to hold a large amount of inventory. This increases investment in inventory-holding facilities on their premises and also blocks capital.</li> <li>● Many processors, especially small-scale firms, lack the necessary monitoring mechanisms to implement quality norms. This results in exports being rejected and returned to India.</li> <li>● The price volatility of products like tomato and onion makes it difficult for processors to plan procurement of raw material.</li> </ul>	MOFPI
Logistics service firm	Logistics	<ul style="list-style-type: none"> <li>● The supply of electricity, which is necessary for their refrigerators, is unstable. Small firms cannot afford to install their own generators.</li> <li>● Due to lack of infrastructure development in rural areas and small-scale production by farmers, it is difficult to deal</li> </ul>	

Stakeholder	Major activities	Problems/issues	Related organization
		with fresh horticultural products.	
Consumer		<ul style="list-style-type: none"> <li>● The price volatility of products like tomato and onion directly affects the household economy of consumers</li> </ul>	

Source: Study team

Table 3-23: Summary of problems, activities and related government ministry for major stakeholders in the value chain of flowers

Stakeholder	Major activities	Problems/issues	Related institution
Farmer	Production Large farmers engage in grading and packing activities. Some large farmers export their product by themselves.	<ul style="list-style-type: none"> <li>● The producers have to pay royalties for new breeds to foreign breeders which are expensive (about USD100,000). So they cannot introduce new varieties of roses<sup>21</sup>.</li> <li>● Quarantine in Japan is extremely strict. If any insect is found in the flowers, exporters have to fumigate the whole consignment which costs a lot.</li> <li>● Small farmers cannot have grading and packing facilities and cold storage on their farms.</li> </ul>	Department of Agriculture
Processor (for flower decorations)	Processing	Due to the lack of timely availability of credit, small processors often cannot meet their working capital requirements and can only purchase less amount of raw material and therefore produce less.	MOFPI
Middleman/unorganized trader	Intermediary and delivery	Access to credit is limited for small-scale middlemen. They are typically dependent on private moneylenders for daily transactions and have to pay high interest rates.	

Source: Study team

### 3.1.3 Evaluation of VC

- The traditional VC of horticulture crops is more complex than expected. It involves numerous middlemen or traders. Nevertheless it can be said flexible and sophisticated as it enables a big volume of crops to reach to the required destinations in a quite short period of time. It also produces a lot of employments.
- In case of fresh vegetables and fruits, there is a tendency that those in a traditional market are better quality than those in non-traditional market like a super market.
- Each state has attempted to explore the possibility of matching farmers with whole sellers or

<sup>21</sup> The figure is based on the interview with the management of International Flower Auction, Bangalore.

consumers directly such as farmer's market. However, most of the cases encounter a difficulty in finding interested buyers. Besides the conditions of selling produce at these occasions may not be attractive for farmers either<sup>22</sup>. Although there are successful cases of farmer's market, they are limited in scale.

- There is a successful example where the motivated farmers explore the sales channel for their produce by themselves. However, information asymmetry of market price and lack of marketing skill are considered as major bottlenecks for farmers to benefit from VC.
- It is difficult for processing units to procure their raw material in a sustainable manner. As the food processing industry is not fully developed, there is no stable demand from processing industries. Besides the farmers are not organized and sales of individual farmer tends to be ad hoc. These issues squeeze farmers' earnings and makes stable supply of raw materials very difficult for food processing industries.
- It is considered difficult to convince farmers who want to have immediate cash to take extra time for post-harvest or processing unless there are assured buyers.
- The private companies targeting export of fresh fruits or vegetable mostly source their raw material from big farmers for the concerns of traceability and stable supply.
- Labor shortage and high labor cost have been a serious issue in production side. In many places, farmers depend on migrant labors for their production works especially during weeding and harvesting.<sup>23</sup> This limits the possibility and willingness of farmers for doing processing at farm level<sup>24</sup>.

### 3.1.4 Need for assistance

The following is a list of suggestions and requests for support in the field of value chains for agriculture in India which the JICA team received from various stakeholders during the research period in India.

#### (1) Infrastructure

- Installation of storage and grading facilities for the use of farmers; these are generally not available in rural areas.
- Installation of ropeway systems in hilly areas to enable farmers to transport their produce to nearby roads.

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<sup>22</sup> Farmers often complained the delayed payments for this kind of government arrangements.

<sup>23</sup> JETRO (2010) "Study on Potential BOP Business Needs for Agricultural Inputs Sector in India"

<sup>24</sup> The percentage of migrant labor considerably varies among states. More than 30% of male population migrate for work in Kerala and Himachal Pradesh, while the percentage is lower than 10 in Madhya Pradesh, Haryana and Gujarat. (Yoshifumi Usami in Yanagisawa and Mizushima (2014))

## **(2) Technology transfer**

- Technology transfer for greenhouse production (protection and engineering) for citrus and papaya.
- Fumigation techniques (such as radiation), which are acceptable for the Japanese quarantine office, to promote the export of Indian fruit.
- Technical assistance on extension and transfer of technology to farmers. Extension is generally weak for most public and private agricultural institutions. The Japanese extension system can become a good model for Indian agriculture.
- Mechanization on farms to respond to labor scarcity in rural areas. As farming in Japan is on a small scale, as in India, the Japanese experience in mechanization can be useful for Indian agriculture.
- Technological assistance for dehydration of fruits and vegetables at the level of farmers, and provision of necessary facilities and equipment. The promotion of dehydration will decrease the wastage of horticultural products.

## **(3) Promotion of agribusiness**

- The development of the seeds business is another potential field. Most farmers use recycled seeds, which eventually become degraded. A new business model where farmers come to use improved seeds has to be developed to solve this problem.
- Promotion of agribusiness of legumes. Although legumes have a lot of potential for value chain improvement, no business model has yet been developed for these crops.

## **(4) Flowers**

- New breeds of flowers that can be grown in open fields, as greenhouses are too costly for small farmers.
- Value addition of flower industry by promoting export.
- Installation of grading and packing facilities for flowers that small flower farmers can use collectively. Technology transfer on chrysanthemum production.

### **3.2 Livestock Sector**

#### **3.2.1 Overview of the sector**

India's livestock sector is one of the largest in the world. According to FAOSTAT, in 2013 India had 57.8 percent of the world's buffaloes, 14.3 percent of cattle, 10.9 percent of sheep and goats, 1.6 percent of camels, 1.0 percent of pigs and 4.1 percent of poultry. The number of buffaloes, cattle and small ruminants such as sheep and goats are significant: India has 115.4 million head of buffaloes, 214.4 million head of cattle, and 237.5 million head of small ruminants. The number of buffalo is particularly worth mentioning: India has more than half the buffalo in the world, and the number of buffalo in India is more than three times

the number in Pakistan, which has the second largest number of buffalo in the world.

Table 3-24: Number of buffalo in the world, 2013

	Country	Head	Share
1	India	115,420,000	57.8%
2	Pakistan	33,700,000	16.9%
3	China	23,253,900	11.6%
4	Nepal	5,241,873	2.6%
5	Egypt	4,200,000	2.1%
6	Myanmar	3,250,000	1.6%
7	Philippines	2,912,842	1.5%
8	Vietnam	2,559,500	1.3%
9	Indonesia	1,484,000	0.7%
10	Bangladesh	1,465,000	0.7%
	Total	199,783,549	100.0%

Source: FAOSTAT

Table 3-25: Number of cattle in the world, 2013

	Country	Head	Share
1	Brazil	217,399,800	14.5%
2	India	214,350,000	14.3%
3	China	113,636,600	7.6%
4	USA	89,299,600	6.0%
5	Ethiopia	54,000,000	3.6%
6	Argentina	51,095,000	3.4%
7	Sudan (former)	41,917,000	2.8%
8	Pakistan	38,300,000	2.6%
9	Mexico	32,000,000	2.1%
10	Australia	29,290,769	2.0%
	Total	1,494,348,769	100.0%

Source: FAOSTAT

Table 3-26: Number of sheep and goats in the world, 2013

	Country	Head	Share
1	China	367,890,909	16.9%
2	India	237,500,000	10.9%
3	Nigeria	97,250,000	4.5%
4	Sudan (former)	96,500,000	4.4%
5	Pakistan	93,700,000	4.3%
6	Australia	79,097,846	3.6%
7	Iran	72,320,000	3.3%
8	Bangladesh	57,500,000	2.6%
9	Ethiopia	51,500,000	2.4%
10	Kenya	48,500,000	2.2%
	Total	2,178,436,193	100.0%

Source: FAOSTAT

Table 3-27: Number of camels in the world, 2013

	Country	Head	Share
1	Somalia	7,100,000	26.3%
2	Sudan (former)	4,787,000	17.7%
3	Kenya	3,100,000	11.5%
4	Niger	1,680,000	6.2%
5	Mauritania	1,500,000	5.6%
6	Chad	1,500,000	5.6%
7	Pakistan	1,000,000	3.7%
8	Mali	978,980	3.6%
9	Ethiopia	925,000	3.4%
10	Yemen	445,000	1.6%
11	India	436,000	1.6%
	Total	27,010,350	100.0%

Source: FAOSTAT

Table 3-28: Number of pigs in the world, 2013

	Country	Head	Share
1	China	482,248,000	49.4%
2	USA	64,775,000	6.6%
3	Brazil	39,040,000	4.0%
4	Germany	27,690,100	2.8%
5	Vietnam	26,261,400	2.7%
6	Spain	25,494,720	2.6%
7	Russia	18,816,357	1.9%
8	Mexico	16,038,000	1.6%
9	France	13,487,588	1.4%
10	Canada	12,879,000	1.3%
18	India	9,300,000	1.0%
	Total	977,020,798	100.0%

Source: FAOSTAT

Table 3-29: Number of poultry birds in the world, 2013

	Country	Head	Share
1	China	6,632,840	27.7%
2	USA	2,164,300	9.0%
3	Indonesia	1,843,953	7.7%
4	Brazil	1,303,600	5.4%
5	India	977,500	4.1%
6	Iran	931,650	3.9%
7	Mexico	540,375	2.3%
8	Russia	495,251	2.1%
9	Pakistan	416,700	1.7%
10	Vietnam	314,700	1.3%
	Total	23,960,902	100.0%

Source: FAOSTAT

## (1) Livestock sector in India

In 2012/13 livestock generated outputs worth INR5,375 billion at current prices, which was 25.63

percent of the value of outputs from the total agricultural, fishery and forestry sector.<sup>25</sup> The total value of outputs was higher than the value of food grains.<sup>26</sup>

In addition, according to *NSS 66<sup>th</sup> Round Survey* (July 2009-June 2010), the total number of workers in farming of animals is 20.5 million as per usual status. Marginal, small and semi-medium farmers who utilize less than 4 hectares of land for agriculture own about 87.7 percent of the livestock. The livestock sector is an important source of income and asset for marginal, small and semi-medium farmers in India.<sup>27</sup>

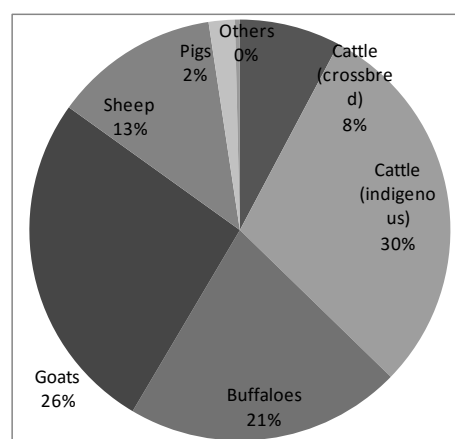
## 1) Livestock population

According to *19<sup>th</sup> Livestock Census 2012*, about 512 million head of livestock excluding poultry are reared in India: cattle, buffaloes, and goats are 37.3 percent, 21.2 percent and 26.4 percent respectively of the total livestock population in India. Sheep and pigs follow these with 12.7 percent and 2.0 percent of the total livestock population respectively. Although pigs are only 2.0 percent of the total livestock population in India there are more than 10 million pigs. India has a significant number of livestock.

Table 3-30: Livestock population in India

	Head
Cattle (crossbred)	39,731,810
Cattle (indigenous)	151,172,295
Buffaloes	108,702,122
Goats	135,173,093
Sheep	65,069,189
Pigs	10,293,695
Horses and Ponies	624,732
Camels	400,274
Donkeys	318,787
Mithun	298,264
Mules	196,378
Yaks	76,662
Total	512,057,301

Source: *19<sup>th</sup> Livestock Census 2012*



Source: *19<sup>th</sup> Livestock Census 2012*

Figure 3-22: Ratio of livestock population in India

## 2) Poultry population

India has about 729 million head of poultry, and about 95.0 percent of total poultry in India are fowls. About 26.9 percent of all fowls are reared in backyards, while 68.1 percent are reared in poultry farms. The majority of fowls reared in backyards are *desi*, a local breed of poultry.<sup>28</sup>

<sup>25</sup> *Annual report 2013-2014*, Department of Animal Husbandry, Dairying and Fisheries.

<sup>26</sup> Report of the working group on animal husbandry and dairying, *Twelfth Five Year Plan 2012-17*.

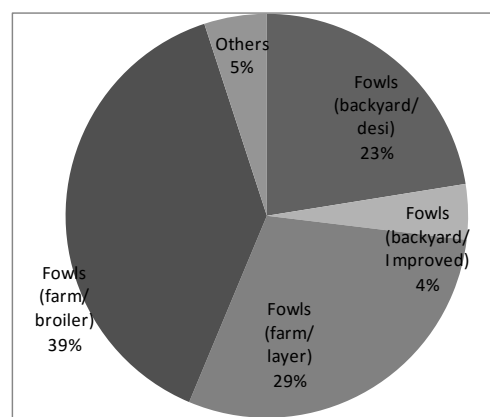
<sup>27</sup> *Annual report 2013-2014*, Department of Animal Husbandry, Dairying and Fisheries.

<sup>28</sup> *19<sup>th</sup> Livestock Census 2012*

Table 3-31: Poultry population in India

	head
Fowls (backyard/desi)	163,840,085
Fowls (backyard/improved)	32,397,914
Fowls (farm/layer)	214,244,416
Fowls (farm/broiler)	282,163,431
Ducks (backyard)	18,598,354
Ducks (farm)	4,940,292
Others	13,024,828
Total	729,209,320

Source: 19<sup>th</sup> Livestock Census 2012



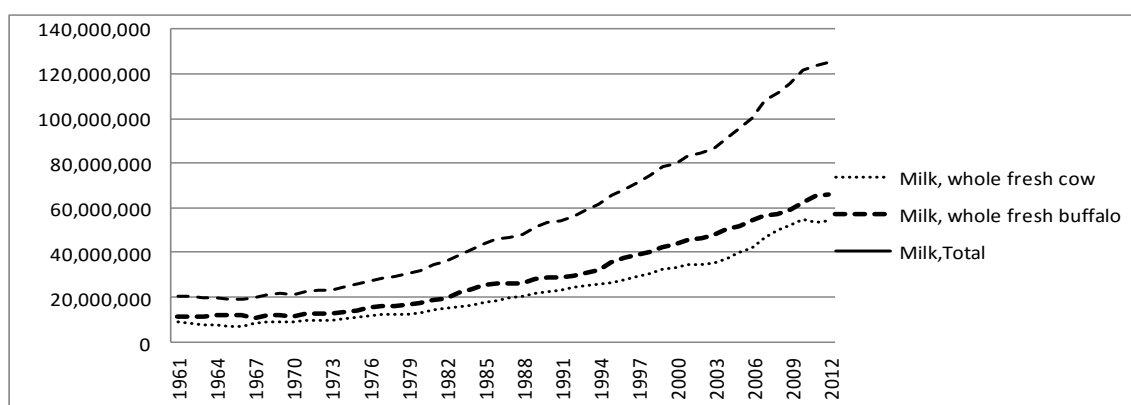
Source: 19<sup>th</sup> Livestock Census 2012

Figure 3-23: Ratio of poultry population in India

### 3) Dairy production

Dairy is the main output of the livestock sector, accounting for 66.7 percent of the total value of output of livestock.<sup>29</sup> The dairy sector has become an important secondary source of income for millions of rural farmers, and has assumed that most important role of providing employment and income-generating opportunities particularly for women and marginal farmers. The per capita availability of milk reached a level of 296.5 g per day during 2012/13. Most milk in the country is produced by small marginal farmers, as well as landless laborers.<sup>30</sup>

According to *Basic Animal Husbandry and Fishery Statistics 2013*, buffalo and cattle respectively contributed 53.4 percent (65.4 million tonnes) and 43.2 percent (57.8 million tonnes) of total milk; the rest of the milk, 3.7 percent (4,782 tonnes), was produced by goats. Historically buffalo milk has been dominant over cattle milk. As shown in Figure 3-24, milk production in India has been increasing since the 1960s. The total milk production in India was estimated at about 132 million tonnes in 2012/13. Although there are nearly twice as many cattle as buffalo, the milk production of buffalo exceeds that of cattle.



Source: FAOSTAT

Figure 3-24: Milk production in India 1961-2012 (tonnes)

<sup>29</sup> Report of the working group on animal husbandry and dairying, *Twelfth Five Year Plan 2012-17*.

<sup>30</sup> *Annual report 2013-2014*, Department of Animal Husbandry, Dairying and Fisheries.

According to the 19<sup>th</sup> Livestock Census 2012, the total number of buffalo and cattle in India in 2012 is about 109 million head and about 191 million head respectively. The population of buffalo has been increasing steadily over the last thirty years, although the rate of increase of the buffalo population has been slowing down. From 1982 to 1992 the number of buffalo increased by 20.7 percent, while it increased by 11.0 percent between 2003 and 2012.

Although the population of cattle increased by 6.3 percent between 1982 and 1992, it has been decreasing since 1992. However the number of crossbred cattle has increased significantly since 1982. India has increased milk production not by increasing the number of cattle, but by increasing the productivity of animals by increasing crossbreeds. However the average milk production per day is still at a low level compared with other dairy countries. The average milk production of crossbred cattle and buffalo is only 7.02 kg per day and 4.80 kg per day respectively.

Table 3-32: Trend in buffalo population in India (million head)

	1982	1992	2003	2012
Total buffalo	69.78	84.21	97.92	108.70
(% increase)	-	20.7%	16.3%	11.0%

Source: 19<sup>th</sup> Livestock Census 2012

Table 3-33: Trend in cattle population in India (million head)

	1982	1992	2003	2012
Total cattle	192.45	204.58	185.18	183.73
(increase ratio) (%)	-	6.3%	-9.5%	-0.8%
Crossbred	8.88	15.22	24.69	39.73
(% crossbred in total cattle)	4.6%	7.4%	13.3%	21.6%

Source: 19<sup>th</sup> Livestock Census 2012

The production of milk has been increasing significantly, and at the same time the consumption of milk and milk products has been increasing. According to industry estimates the consumption of dairy products grew at 6.8 percent a year during the last decade. The major factors for the increase in milk consumption are population growth, greater affordability because of increased disposable income, increased awareness and availability of dairy products, and increased consumer interest in high protein diets.<sup>31</sup> According to the NSS 68<sup>th</sup> Round, the consumption of milk per capita increased from 2004/05 to 2011/12: the monthly consumption per capita of liquid milk increased from 3.866 liters in 2004/05 to 4.333 liters in 2011/12 in rural areas, and from 5.107 liters in 2004/05 to 5.422 liters in 2011/12 in urban areas.

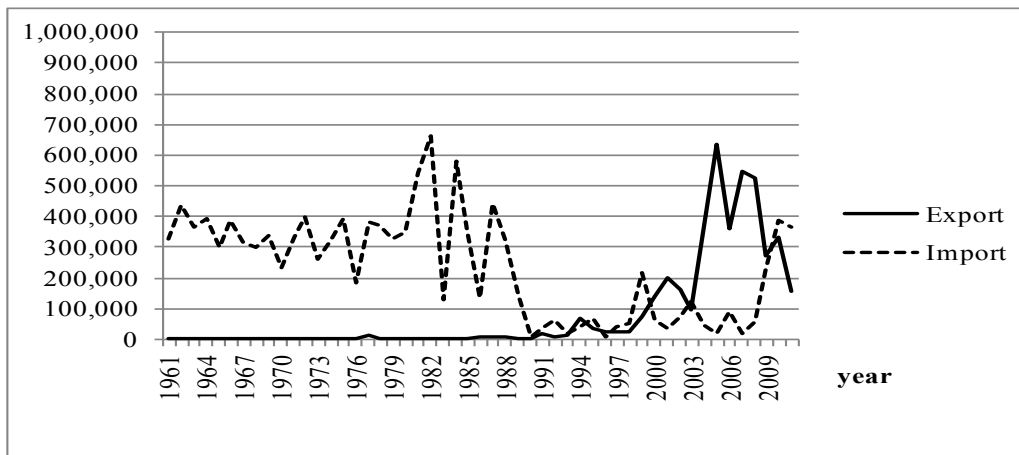
<sup>31</sup> GAIN Report – India Dairy and Products Annual 2013.

Table 3-34: Consumption of liquid milk from 2004/05 to 2011/12

	Per capita monthly consumption (liters)		Percentage of consuming households (in 30 days)	
	Rural	Urban	Rural	Urban
2004/05	3.866	5.107	71.3%	85.0%
2009/10	4.117	5.358	76.4%	84.9%
2011/12	4.333	5.422	78.0%	84.9%

Source: Household consumption of various goods and services in India 2011/12, NSSO

According to FAOSTAT, the volume of milk imported exceeded the amount exported from 1961 to the beginning of the 1990s, indicating that India had a deficit in milk production until the beginning of the 1990s. The volume of milk exported exceeded the volume imported from 2004 until 2009. However in 2010 and 2011 again India had a deficit in milk production. Although milk production has been increasing, India still needs to produce more milk in order to meet domestic demand.



Source: FAOSTAT

Figure 3-25: Import and export volume of milk in India (tonnes)

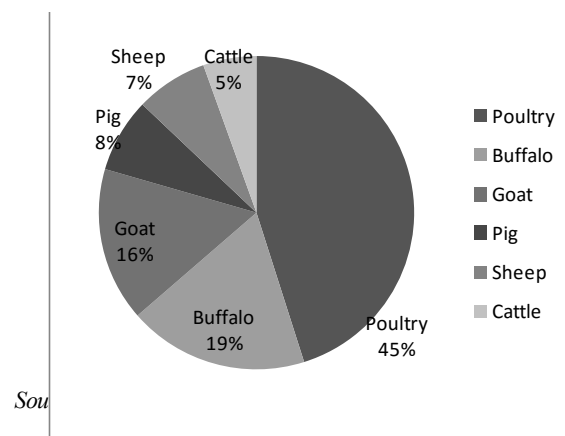
#### 4) Meat production

According to *Basic Animal Husbandry and Fisheries Statistics 2013*, about 5.95 million tonnes of meat was produced during 2012/13. About 45 percent of meat produced in India is poultry meat, with 2.68 million tonnes; this is followed by 1.10 million tonnes of buffalo meat, which is 19 percent of total meat production. For religious reasons the production and consumption of cattle is relatively low in India.

Table 3-35: Annual meat production in India 2012/13

	Annual production (thousand tonnes)	%
Poultry	2,681.60	45%
Buffalo	1,103.85	19%
Goat	941.16	16%
Pig	453.05	8%
Sheep	441.14	7%
Cattle	327.03	5%
Total	5,948.17	100%

Source: Basic Animal Husbandry and Fisheries Statistics 2013



The monthly consumption per capita of animal origin protein, such as fish/prawn, goat meat/mutton, cattle/buffalo meat and chicken, in 2011/12 is shown in Table 3-36. This indicates that fish/prawn is the major animal origin protein in India, followed by chicken. Monthly consumption of goat meat/mutton and cattle/buffalo meat is less than 10 g. A large percentage of people practice vegetarianism in India, and for religious reasons people who practice Hinduism do not eat bovine meat. Muslim people do not have any restrictions on consuming bovine meat, and it is said that poorer people among Muslims tend to consume bovine meat because of its lower price in India.

Table 3-36: Monthly consumption in India 2011/12

Item	Rural	Urban
Fish/Prawn	83g	88 g
Chicken	37 g	53 g
Goat meat/mutton	4 g	12 g
Cattle/buffalo meat	3 g	46 g
Pork	1 g	1 g

Source: Household Consumption of Various Goods and Services in India 2011/12

According to FAOSTAT, the export volume as well as value of bovine meat is highest out of chicken, goat meat/mutton, bovine and pork meat in India. The export of bovine meat has been increasing since 1979. The export quantity of bovine meat reached 984,437 tonnes with a value of 2.6 billion USD in 2011. India is the second largest bovine-exporting country after Brazil.

Table 3-37: Export volume and export value of meat in 2011

Item	Tonnes	thousand USD
Cattle/buffalo meat	984,437	2,632,295
Sheep	10,615	53,604
Chicken	8,767	14,150
Goat	129	415

Source: FAOSTAT

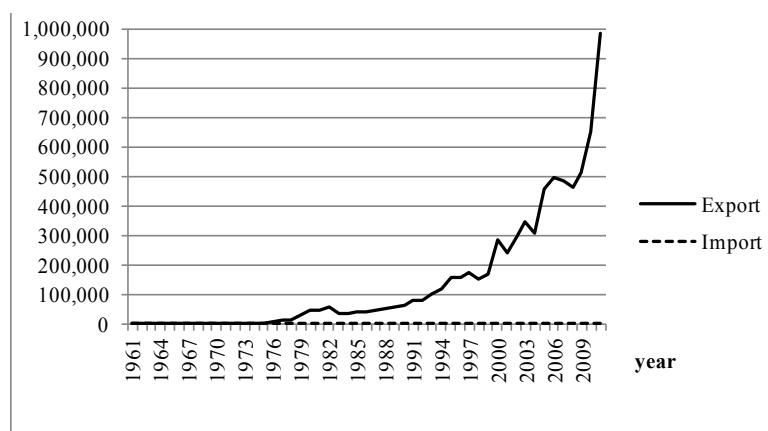


Figure 3-27: Import and export volume of bovine meat in India (tonnes)

The majority of bovine meat for export is buffalo; only 359 tonnes of the 984,437 tonnes of bovine meat exported in 2011 was cattle meat. The buffalo meat export price has been rising steadily since 2002/03 as shown in Table 3-38; the buffalo meat export price in 2011/12 was 2.931 USD per kg, which is three times higher than in 2002/03.

Vietnam, which imported 264,772 tonnes of buffalo meat in 2011/12, is the country that imports most buffalo meat from India.<sup>32</sup> Since India is not officially approved by the World Organization for Animal Health (OIE) as a country free from Foot-and-Mouth Disease (FMD), there is a restriction on India exporting their livestock products to FMD-free countries, including Japan, the US and European countries. People in the industry say that if it becomes an FMD-free country, India will be able to export buffalo meat to FMD-free countries and the export price of buffalo meat will rise. Scientific results show that buffalo meat is healthier than cattle meat. Buffalo meat has the potential to be sold as healthy meat in developed countries. Based on this situation the buffalo meat export industry seems promising, but there is some debate on the export of buffalo meat due to the religiously-sensitive nature of the topic.<sup>33</sup>

Table 3-38: Buffalo meat export price

Year	INR/kg	USD/kg
2000/01	47.74	1.045
2001/02	47.03	0.986
2002/03	43.82	0.906
2003/04	44.70	0.973
2004/05	52.63	1.171
2005/06	57.17	1.291
2006/07	65.00	1.435
2007/08	73.46	1.825
2008/09	104.90	2.285
2009/10	112.18	2.366
2010/11	119.53	2.623
2011-12	142.50	2.931

Source: Directorate General of Foreign Trade

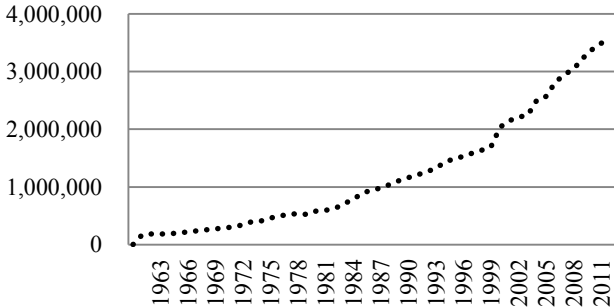
Table 3-39: Top ten buffalo meat-importing countries from India in 2011/12

	Country	Tonnes	Million INR
1	Vietnam	268,772	40,083
2	Malaysia	98,025	13,880
3	Egypt	70,173	11,432
4	Jordan	68,370	8,777
5	Saudi Arabia	65,528	9,466
6	Philippines	45,477	5,472
7	Algeria	43,099	5,775
8	UAE	40,282	4,938
9	Iran	22,222	2,828
10	Thailand	28,502	4,209
	Total	972,863	136,178

Source: Directorate General of Foreign Trade

**5) Egg production**

Keeping poultry is a household activity in India. Through policy interventions by government and the enterprise of private players, poultry farming has been transformed into a very scientific operation. As a result the production of eggs has increased dramatically. Egg production was 170,000 tonnes in



Source: FAOSTAT  
Figure 3-28: Egg production from 1961 to 2012 (tonnes)

<sup>32</sup> Some people in the industry say that buffalo meat exported from India to Vietnam is re-exported to China.

<sup>33</sup> *The Times of India*, July 30, 2014.

1961, but it increased up to 3.6 million tonnes in 2012. Over five decades production increased twenty-fold.

### (3) State-wise production and consumption of major livestock products

Figure 3-28 indicates major producing states of livestock products such as milk, egg and meat. The ten largest producing states of each livestock product are described.

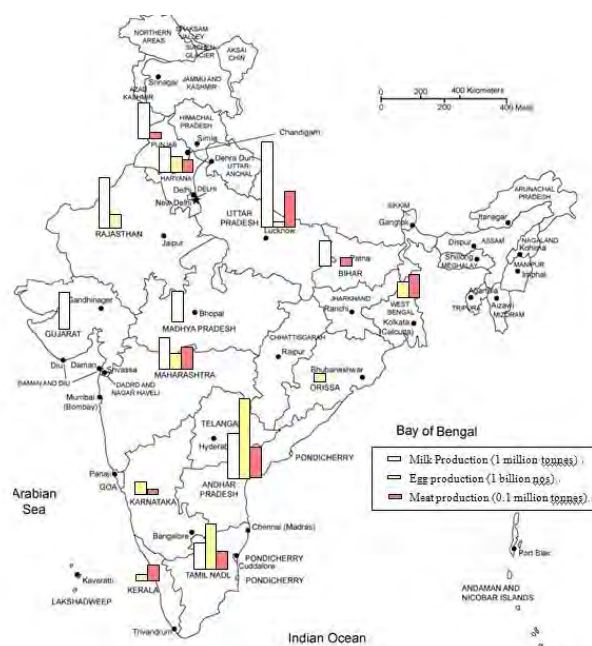
The figure indicates that Haryana, Uttar Pradesh, Maharashtra, AP and Tamil Nadu are the major producing states of major livestock products.<sup>34</sup>

#### 1) Dairy

According to *Basic Animal Husbandry and Fisheries Statistics 2013*, the annual milk production in India is 155.2 million tonnes. The ten largest milk-producing states are listed in Table 3-40. The six largest milk-producing states, Uttar Pradesh, Rajasthan, AP, Gujarat, Punjab and Maharashtra, produce more than half the milk in India.

Figure 3-29 depicts annual milk production volume and annual liquid milk consumption volume with size of circles. Because Uttar Pradesh has a large population the consumption of milk in Uttar Pradesh is the highest: approximately 12.3 million tonnes of liquid milk is consumed in the state. Rajasthan, the second largest milk-producing state, is also the second largest milk-consuming state; Rajasthan produces 13.9 million tonnes of milk and consumes 7.5 million tonnes of liquid milk. It indicates that milk is mainly produced in/nearby states in which it is consumed.

The monthly liquid milk consumption in rural and urban areas is indicated by the length of the bar. The



Source: *Basic Animal Husbandry and Fisheries Statistics 2013*

Figure 3-29: Production volume of milk, egg and meat in India

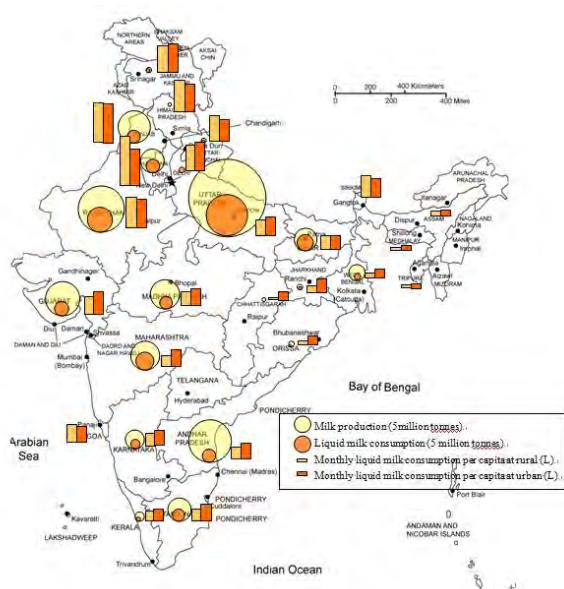
Table 3-40: Annual milk production in ten largest milk-producing states

	State	Annual milk production (thousand tonnes)	%
1	Uttar Pradesh	23,330	15.0%
2	Rajasthan	13,946	9.0%
3	Andhra Pradesh	12,762	8.2%
4	Gujarat	10,315	6.6%
5	Punjab	9,724	6.3%
6	Madhya Pradesh	8,838	5.7%
7	Maharashtra	8,734	5.6%
8	Haryana	7,040	4.5%
9	Tamil Nadu	7,005	4.5%
10	Bihar	6,845	4.4%
	Total	155,209	100.0%

Source: *Basic Animal Husbandry and Fisheries Statistics 2013*

<sup>34</sup> Although Telangana and AP are now divided into two states, the data of AP includes both Telangana state and AP state.

monthly milk consumption per capita varies from state to state. For example, a rural person in Haryana consumes 14.790 liters of milk per month, while a rural person in Chhattisgarh consume only 0.655 liters of milk per month. People in northern states such as Haryana and Punjab consume more milk than other states. In terms of monthly per capita consumption, Haryana, Punjab, Himachal Pradesh and Rajasthan are milk-consuming states.



Source: Basic Animal Husbandry and Fisheries Statistics 2013 and Household Consumption of Various Goods and Services in India 2011/12

Figure 3-30: Total production and total consumption of milk in each state and monthly liquid milk consumption per capita in each state



Source: Operation Flood, NDDB

Figure 3-31: National Milk Grid

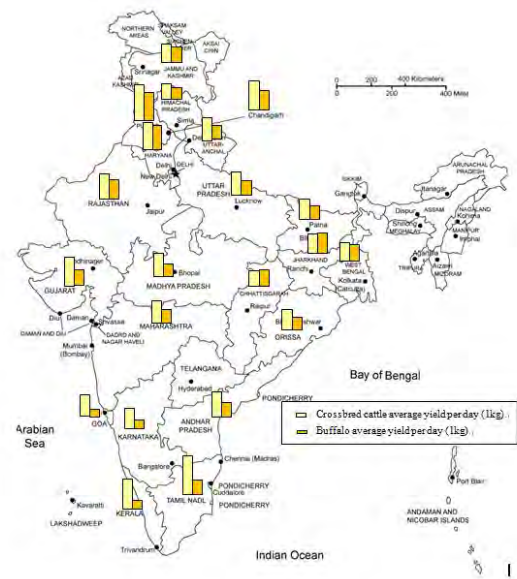
Operation Flood, the world’s largest food and development program, was implemented in three phases from 1970 to 1996 and resulted in India becoming the world’s leading milk-producing country. The objective of Operation Flood was to develop rural milk production through an extensive network of village milk producer cooperatives based on the successful Anand Pattern, in order to supply a growing urban demand.<sup>35</sup>

In order to connect the rural milk producer and the four metropolitan cities - Mumbai, Delhi, Calcutta and Chennai - and to stabilize the milk price in these cities, Regional Milk Grids were established during Operation Flood Phase I (1970-1980). Under Phase II (1979-1985) the Regional Milk Grids were merged into a National Milk Grid to reach out to a wider urban market. The Grid eliminated regional and seasonal imbalances as well as narrowed down price disparities, ensuring a convenient and sustained year-round milk supply to consumers across the country.

<sup>35</sup> Operation Flood: A Saga of Successful Partnership, NDDB.

The National Milk Grid, shown in Figure 3-30, was backed by storage and long distance transport facilities with a fleet of rail and road tankers. According to Mother Dairy Fruit and Vegetable Private Limited owned by NDDB, the company procures milk every day from Gujarat, Maharashtra and AP by railway and road tanker in order to meet demand for milk in Delhi. The company procures 7-8,000,000 liters of milk from Maharashtra and 200,000 liters of milk from AP every day. After pasteurizing, standardizing and chilling the milk, it is loaded into insulated train containers or insulated road tankers in which temperature rises only one degree in twenty-four hours. Although it takes thirty-six to forty-eight hours from AP to Delhi by train, the quality of milk can be maintained.

The average yield per day of cattle and the average yield per day of buffalo by state are described by the length of bar colored yellow and orange respectively in Figure 3-31. Although Uttar Pradesh is the largest milk-producing state, the average milk yield per day of cattle and buffalo are 7.08 kg per day and 4.44 kg per day respectively, which ranks below the ten highest states in India. Punjab is the most progressive state in terms of average milk yield per day for both cattle and buffalo - 11.00 kg per day and 8.64 kg per day respectively. The states surrounding Punjab, such as Haryana, Chandigarh and Rajasthan, also have high productivity in terms of average milk yield per day.



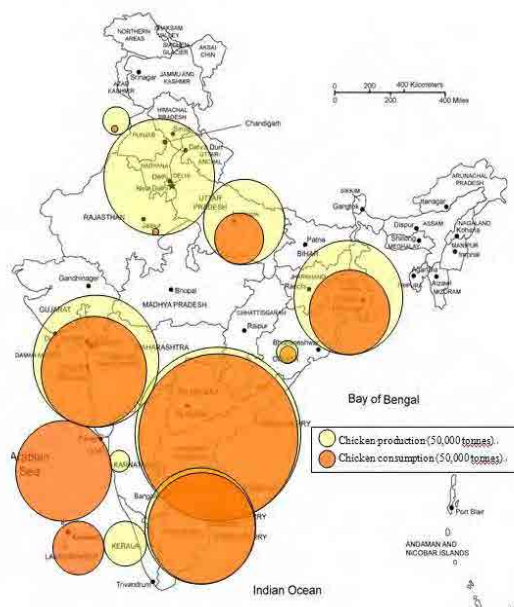
Source: Basic Animal Husbandry and Fisheries Statistics 2013

Figure 3-32: Average milk yield per day of crossbred cattle and buffalo

## 2) Meat<sup>36</sup>

As mentioned in the previous section, 45.1 percent of total meat produced in India is poultry meat. AP, Maharashtra, Tamil Nadu and West Bengal contribute about 70 percent of the total poultry meat produced in India. These chicken-producing states are also chicken-consuming states, except Haryana. Karnataka and Kerala produce less poultry than they consume.

The second largest production of meat in India is buffalo meat, which is 18.6 percent of total meat production. Cattle are considered sacred in Hinduism, the dominant religion in India. Although buffalo and cattle are different bovine species, slaughtering of buffalo can be an issue. On the other hand, a certain number of cattle are slaughtered for meat; about 327,000 tonnes of cattle meat is produced, which is 5.5 percent of total meat production. As shown in Table 3-41 the largest bovine meat-producing state is Uttar Pradesh, followed by Kerala, Punjab and AP. Data on bovine meat production in some states such as Chhattisgarh, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand and Orissa, are not available. The main players in the bovine meat industry are Muslims, the largest religious minority in India. Uttar Pradesh and Kerala, large bovine meat-producing states, have a relatively high proportion of Muslims. Although there is some debate on the beef industry in India the government provides some schemes to support the beef industry, such as salvaging and rearing of male buffalo calves and modernization of abattoirs.



Source: *Basic Animal Husbandry and Fisheries Statistics 2013 and Household Consumption of Various Goods and Services in India 2011-12*

Figure 3-33: Annual poultry meat production and consumption

<sup>36</sup> Report of the working group on animal husbandry and dairying, *Twelfth Five Year Plan 2012-17*.

Table 3-41: Estimated production of bovine meat in 2012/13 (thousand tonnes)

States	Cattle	Buffalo	Total
Uttar Pradesh	-	516.36	516.36
Kerala	134.66	100.22	234.88
Punjab	-	122.12	122.12
Andhra Pradesh	-	117.69	117.69
Maharashtra	37.37	51.68	89.05
Bihar	21.44	44.25	65.69
Tamil Nadu	35.97	8.86	44.83
Rajasthan	-	25.91	25.91
Karnataka	17.40	7.86	25.26
West Bengal	9.59	13.46	23.05
Madhya Pradesh	-	15.10	15.10
Uttarakhand	-	4.15	4.15
Goa	1.83	0.02	1.85
Gujarat	-	1.48	1.48
Chhattisgarh	-	-	-
Haryana	-	-	-
Himachal	-	-	-
Jammu and Kashmir	-	-	-
Jharkhand	-	-	-
Orissa	-	-	-
Total	327.03	1,103.85	1430.88

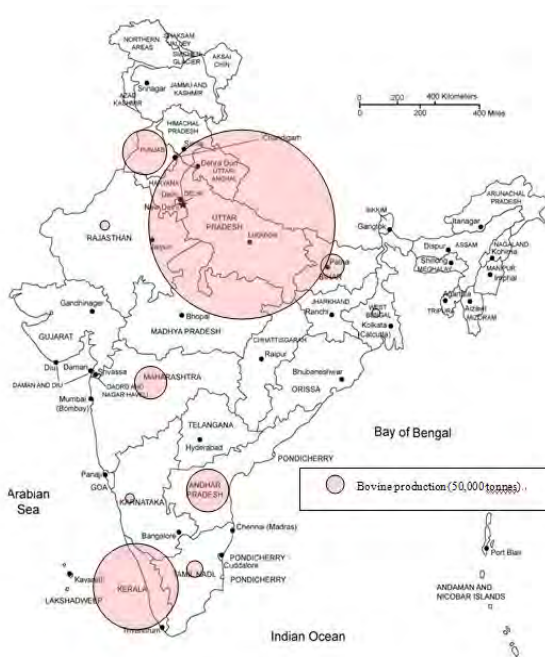
Source: Basic Animal Husbandry and Fisheries Statistics 2013

Uttar Pradesh produces about half of buffalo meat, followed by Punjab and AP. Buffalo meat processed in Uttar Pradesh is transported by railway in reefer containers to Mumbai port for export.

AP, West Bengal, Maharashtra, Bihar, Orissa and Rajasthan are important states for small ruminant meat. About 70 percent of pork is produced in eastern and north-eastern states.

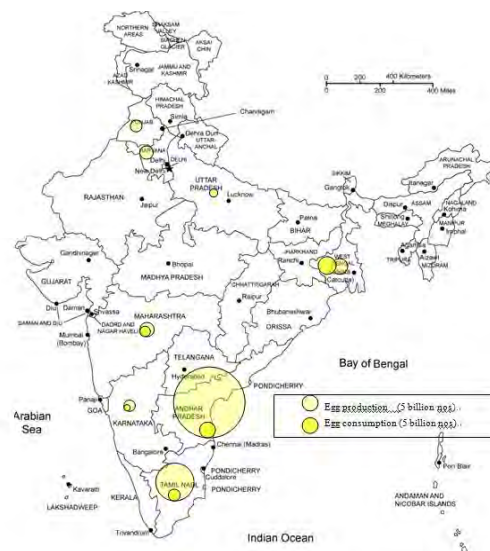
### 3) Eggs<sup>37</sup>

AP and Tamil Nadu are the largest and second largest egg-producing states, with 32 percent and 18 percent of total eggs produced respectively. Haryana, Punjab, West Bengal, Maharashtra and Karnataka each contribute five to six percent of the total egg output. Egg production grew at an accelerated rate from 4.2



Source: Basic Animal Husbandry and Fisheries Statistics 2013

Figure 3-34: Estimate production of bovine meat



Source: Basic Animal Husbandry and Fisheries Statistics 2013 and Household Consumption of Various Goods and Services in India 2011-12

Figure 3-35: Annual egg production and consumption

<sup>37</sup> Report of the working group on animal husbandry and dairying, *Twelfth Five Year Plan 2012-17*.

percent per year during 1990s to 5.6 percent per year afterwards, primarily because of rapid growth in Tamil Nadu, Haryana, Gujarat, Bihar and Orissa.

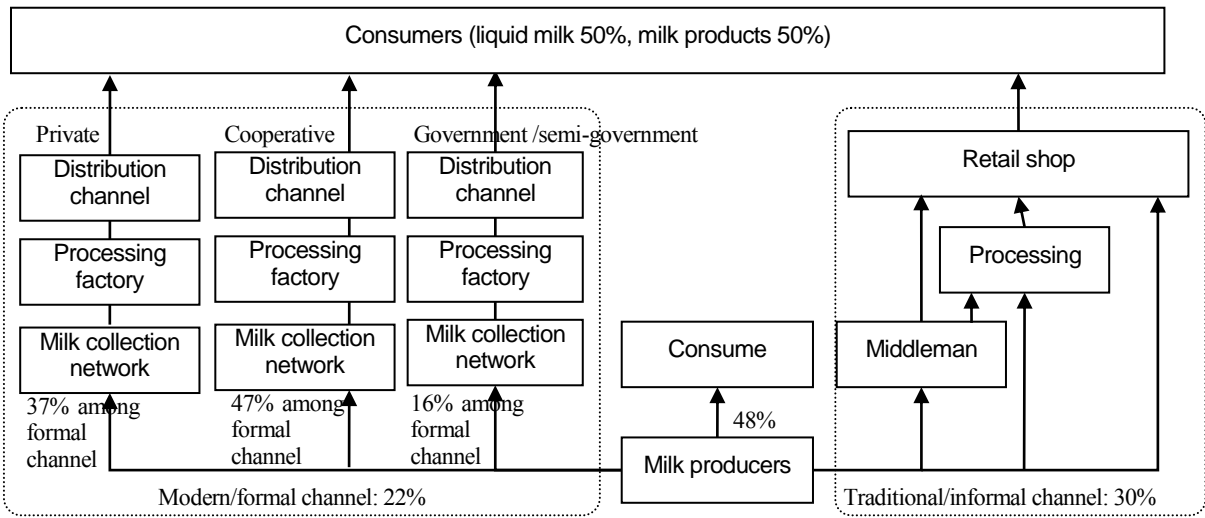
**3.2.2 Current status of and bottlenecks in value chains**

**(1) Outline of value chains**

**1) Milk**

It is estimated that about 48 percent of milk is consumed at village level, and only 52 percent of milk is marketed. About 30 percent of milk is distributed through traditional/informal channels, while about 22 percent of milk is processed and distributed through modern/formal channels.

According to the World Bank,<sup>38</sup> the formal processing sector has a total installed capacity of 98 million liters per day, of which cooperative, private and government/semi-governmental dairies share 37 percent, 47 percent, and 16 percent respectively. Delhi Milk Scheme is an example of government/semi-governmental dairies, while Gujarat Cooperative Milk Marketing Federation, which has Amul brand as well as Mother Dairy Fruit and Vegetable Private Limited, is an example of cooperative dairy. About half the milk is consumed in liquid form, and the rest is consumed as processed dairy products.



Source: Interview with Department of Animal Husbandry and Dairying and NDDB

Figure 3-36: General dairy value chain in India

**a) Delhi Milk Scheme**

Delhi Milk Scheme (DMS) processes liquid milk and manufactures value-added milk products such as yoghurt, ghee, butter, panir, chach and flavored milk for the citizens in Delhi under the Department of

<sup>38</sup> Demand-led transformation of the livestock sector in India, World Bank (2011).

Animal Husbandry, Dairying and Fisheries. DMS procures raw fresh milk from the State Dairy Federations of the neighboring states of Punjab, Haryana, Uttar Pradesh, Rajasthan and Bihar and from the cooperative societies, etc. DMS procured 48.5 million kg of milk in 2013/14. The detail of milk procured by DMS from 2010/11 to 2013/14 is shown in Table 3-42. DMS has a network of over 1,056 outlets.

Table 3-42: Procured and sales volume of milk by DMS from 2010/11 to 2013/14

Year	Procured milk (lakh kg) (year)	Procured milk (lakh kg) (per day)	Milk sales (lakh liters)
2010-11	792.05	2.17	1,183.49
2011-12	870.13	2.38	1,123.62
2012-13	1,077.60	2.95	1,096.92
2013-14	485.32	1.33	973.28

Source: Annual Report 2013-14, Department of Animal Husbandry, Dairying and Fisheries

## b) Cooperative societies

Dairy cooperatives started in Gujarat, then spread throughout India. In 2012/13, 155,634 dairy cooperative societies were organized with 15.1 million members; these procured 32.8 million kg of milk per day and sold 23.8 million liters per day of milk. The structure of these cooperatives is based on the Anand Pattern (Amul Model), with a three-tier cooperative structure: a dairy cooperative society at village level, affiliated to a milk union at district level, which in turn is federated into a milk federation at state level. Each federation has their own brand such as Mother Dairy or Amul.

Table 3-43 shows an outline of cooperatives in India. Although the number of cooperatives is large in Uttar Pradesh, Maharashtra and Rajasthan, the number of producer members and quantity of milk procured by cooperatives are not so large. Gujarat is the largest state in terms of quantity of milk procured by cooperatives, followed by Karnataka and Maharashtra. The share of cooperatives of marketed milk in Table 3-43 is calculated by the quantity of milk procured by cooperatives divided by the quantity of marketed milk, and the quantity of marketed milk is calculated based on the assumption that 60 percent of milk production is marketed. In addition, it is estimated that 70 percent of milk marketed in Gujarat is collected by cooperatives. It can be said that the milk procurement system of cooperatives is well developed in Gujarat.


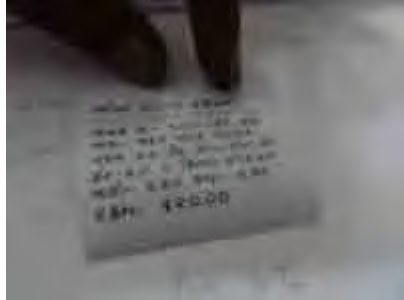

Table 3-43: Number of dairy cooperative societies, number of producer members, amount of milk procured by cooperatives, and share of cooperatives of marketed milk

	State	Dairy cooperative society (number)	Producer members (thousands)	Milk procured by cooperatives (thousand kg/day)	Share of cooperatives of marketed milk (%)
East	Assam	226	7	15	1%
	Bihar	12,928	736	1,224	11%
	Jharkhand	57	1	6	0%
	Nagaland	51	2	2	2%
	Orissa	5,093	260	381	13%
	Sikkim	307	10	13	19%
	Tripura	92	6	3	2%
	West Bengal	3,080	221	170	2%
North	Haryana	7,050	310	381	3%

	State	Dairy cooperative society (number)	Producer members (thousands)	Milk procured by cooperatives (thousand kg/day)	Share of cooperatives of marketed milk (%)
	Himachal Pradesh	807	34	71	4%
	Jammu and Kashmir	-	-	-	-
	Punjab	7,393	402	1,231	8%
	Rajasthan	16,482	701	1,931	8%
	Uttar Pradesh	23,070	967	486	1%
South	Andhra Pradesh	5,314	857	1,951	9%
	Karnataka	13,527	2,274	4,907	52%
	Kerala	3,750	876	888	19%
	Tamil Nadu	11,334	2,238	2,491	22%
West	Chhattisgarh	934	37	37	2%
	Goa	178	19	45	45%
	Gujarat	15,112	3,041	12,443	73%
	Madhya Pradesh	7,029	280	799	5%
	Maharashtra	21,717	1,798	3,318	23%

Source: National Dairy Development Board - Annual Report 2012/13 and Basic Animal Husbandry and Fisheries Statistics 2013

One of the objectives of cooperatives is to maximize benefits to farmers. NDDDB said that dairy farmers can get 70-80 percent of the retail price. With cooperatives in Gujarat, farmers are paid INR32.78 per liter of milk with 6.0 percent fat at milk collecting centers, while the retail price of milk with 6.0 percent fat is INR23 per 500 ml. This means that farmers are paid more than 70 percent of the retail price.

		
Examining fat % at milk collecting center of cooperative	Information on fat %, milk price and amount	Products (6% fat, 500 ml INR23)

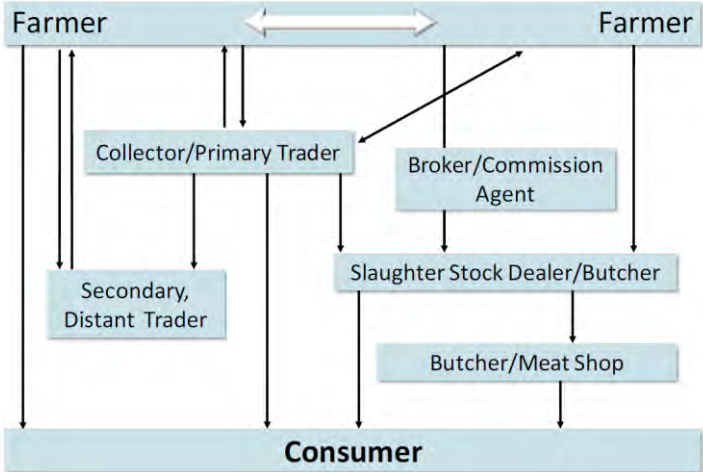
Photos: Study Team

## 2) Meat (bovine and small ruminants)

According to the World Bank, generally market chains for cattle and small ruminants are fairly similar. Typical market chains for cattle and small ruminants in Bihar and Orissa are shown in Figure 3-36. Farmer to farmer exchanges account for about 20 percent of transactions, which mainly take place for breeding stock and replacement animals. Transactions in meat animals are dominated by traders, who buy animals from farmers directly or through brokers, and after building large herd sell the animals in urban markets to

larger traders or butchers for slaughter at much higher prices. In some states the slaughter of cattle is prohibited. Therefore cattle from these states are taken to neighboring states where slaughter is allowed.

For the domestic consumer market, animals are slaughtered in registered and unregistered slaughterhouses, unregistered slaughter slabs and in open places in urban areas. In rural areas slaughter in slabs and open spaces is widely used. There are 5,520 registered and 4,707 unregistered slaughterhouses in India. And about half the total marketed meat for domestic consumption is slaughtered at unregistered slaughterhouses.

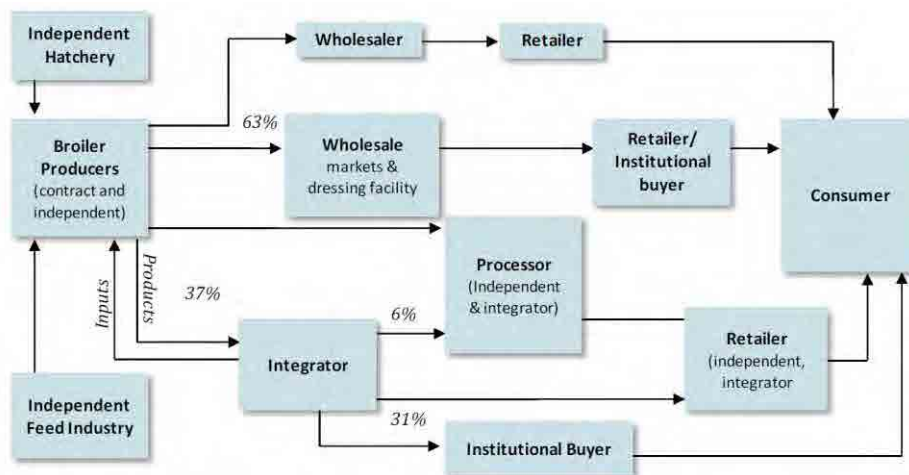


Source: Demand-led transformation of the livestock sector in India, 2011, World Bank

Figure 3-37: Typical market chains for cattle and small ruminants in Bihar and Orissa

**3) Poultry**

According to the World Bank the most important organizational change in poultry has been the introduction of contract farming in broiler production. Until the middle of the 1980s backyard poultry kept by smallholders on mixed farming used to supply the majority of poultry meat and eggs. Live birds and eggs were marketed through traditional value chains involving intermediaries such as collectors, wholesalers and retailers, but without processing or value addition. Rapid transformation has occurred since then with increased commercial production of poultry using improved technology (breeds, feed and management), which also led to the development of new types of value chain led by the private sector. Figure 3-37 shows a general map of the major value chains for broilers currently operating in India. Only 6 percent of total poultry meat goes through value-added processing, mainly in the form of dressed broilers. The modern poultry processing sector includes ten to twelve firms that together process about 12,000 tonnes of poultry meat annually, or one to two percent of consumption.



Source: *Demand-led transformation of the livestock sector in India, 2011, World Bank*

Figure 3-38: General value chains for broilers and poultry markets in India

#### 4) Infrastructure

##### a) Meat processing plant/Milk processing plant

The meat processing plants aimed at export have well-established facilities certified by international standards such as ISO and HACCP. Hygiene management is also practiced. The milk processing plants for the domestic market have also acquired international standards such as ISO and HACCP.

Things are kept tidy and in order, but participatory activities for 5S,<sup>39</sup> quality control and improvement of productivity are not carried out because there are no leaflets or posters to advocate such activities. In addition there is waste in terms of productivity. If quality could be stabilized and the yield rate improved, businesses would benefit.

##### b) Transportation

Processed frozen meat for export is transported in reefer containers. The reefer containers are taken by truck to the loading area for railway transportation. After being transported to the port by railway, the reefer containers are sent overseas. The facility of reefer containers seems well-established.

Insulated road tankers and railway containers are commonly used for long distance transportation of milk. After pasteurizing, standardizing and chilling of milk, milk can travel for twenty to forty hours under hygienic conditions. The long-distance milk transportation system seems well-established in India.

However these freezing and chilling facilities are not common for traditional distribution channels for milk and meat. Milk is distributed without a chilling facility. After slaughtering the animal, meat is

<sup>39</sup> “5S” is a workplace organization methodology that uses five Japanese words, Seiri, Seiton, Seiso, Seiketsu, and Shitsuke. These Japanese words have been converted in English to Sorting, Setting-in-Order, Shining, Standardizing and Sustaining the Discipline.

sometimes transported and kept at normal temperature.

**c) Road**

In the case of processed meat for export, trucks with reefer containers are driven slowly at night because of poor road conditions (e.g. it can take four to five hours to travel 40-50 km).

**d) Electricity**

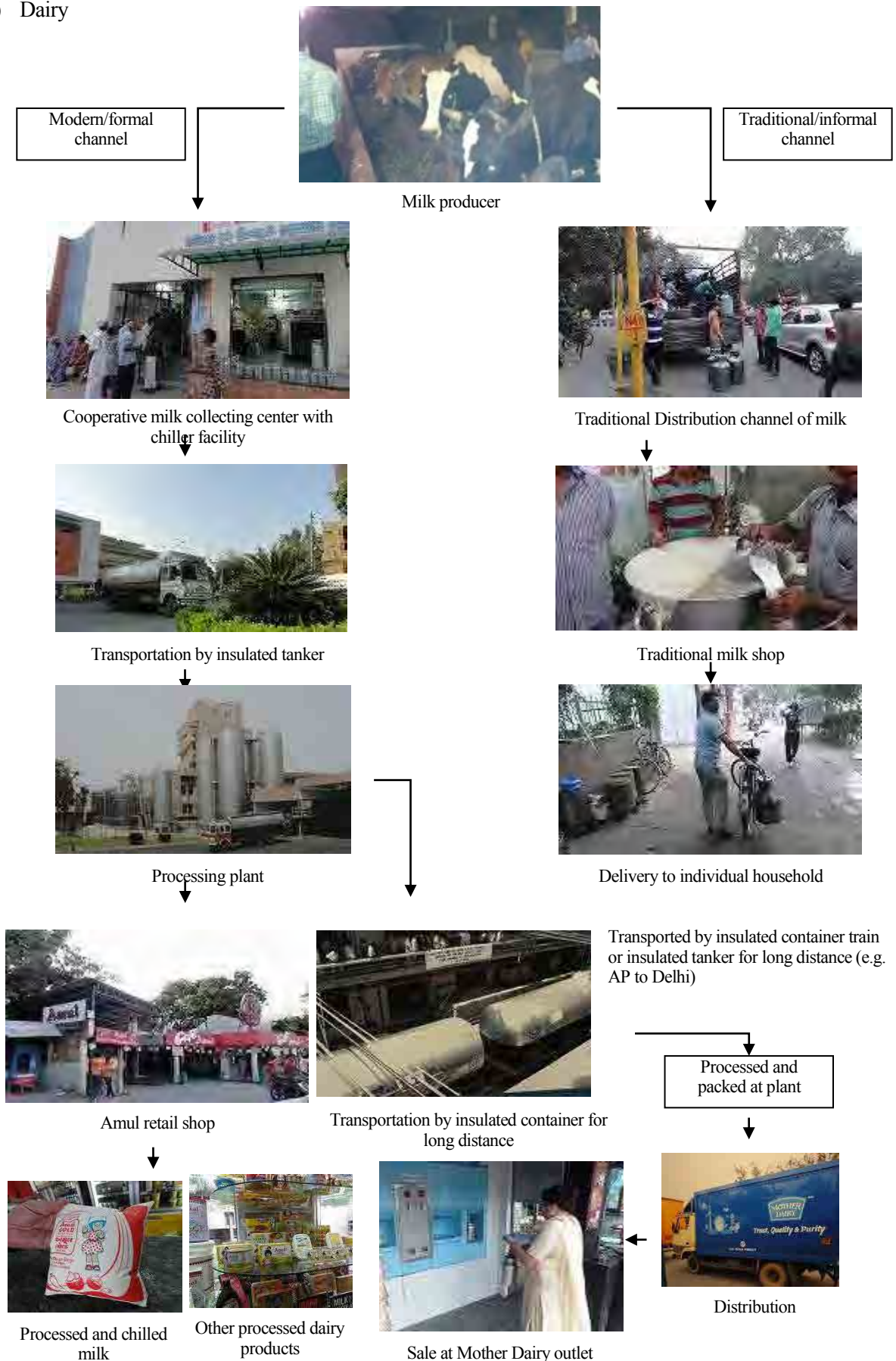
There can be frequent power cuts in India. Meat processing plants and milk processing plants usually install their own generators. Since diesel generators costs more than the normal electricity supply, power cuts increase costs.

Electricity is one of the critical issues for milk quality at milk collecting centers in rural areas. During power cuts or in areas without electricity, diesel generators are used. Again, this increases costs.

**(2) Value chains at a glance**

This section describes actual value chains of major livestock sectors, such as dairy, meat and poultry.

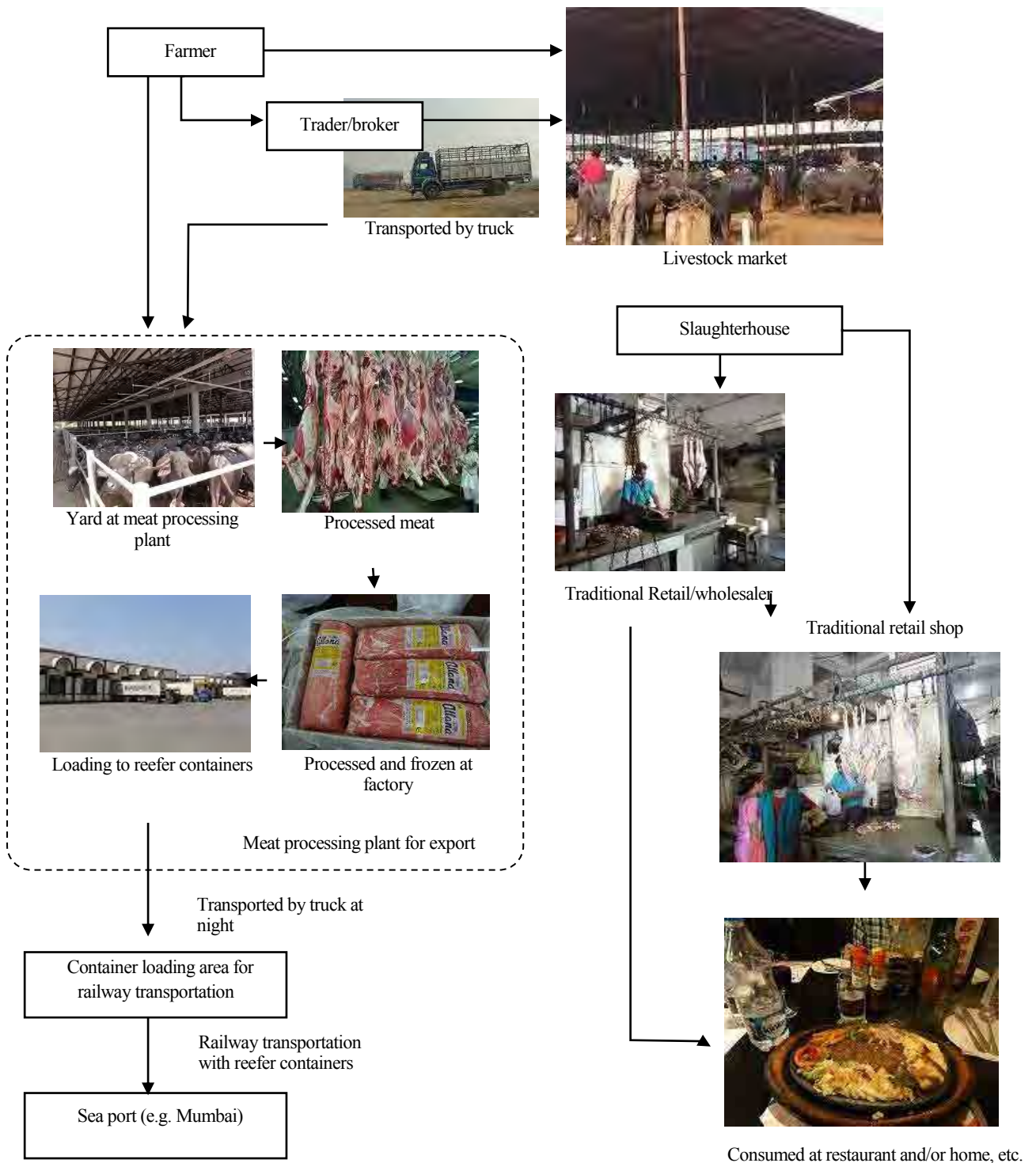
1) Dairy



Source and photos: Study Team (Photos of transportation and distribution are provided by NDDDB)

Figure 3-39: Supply chain for dairy products

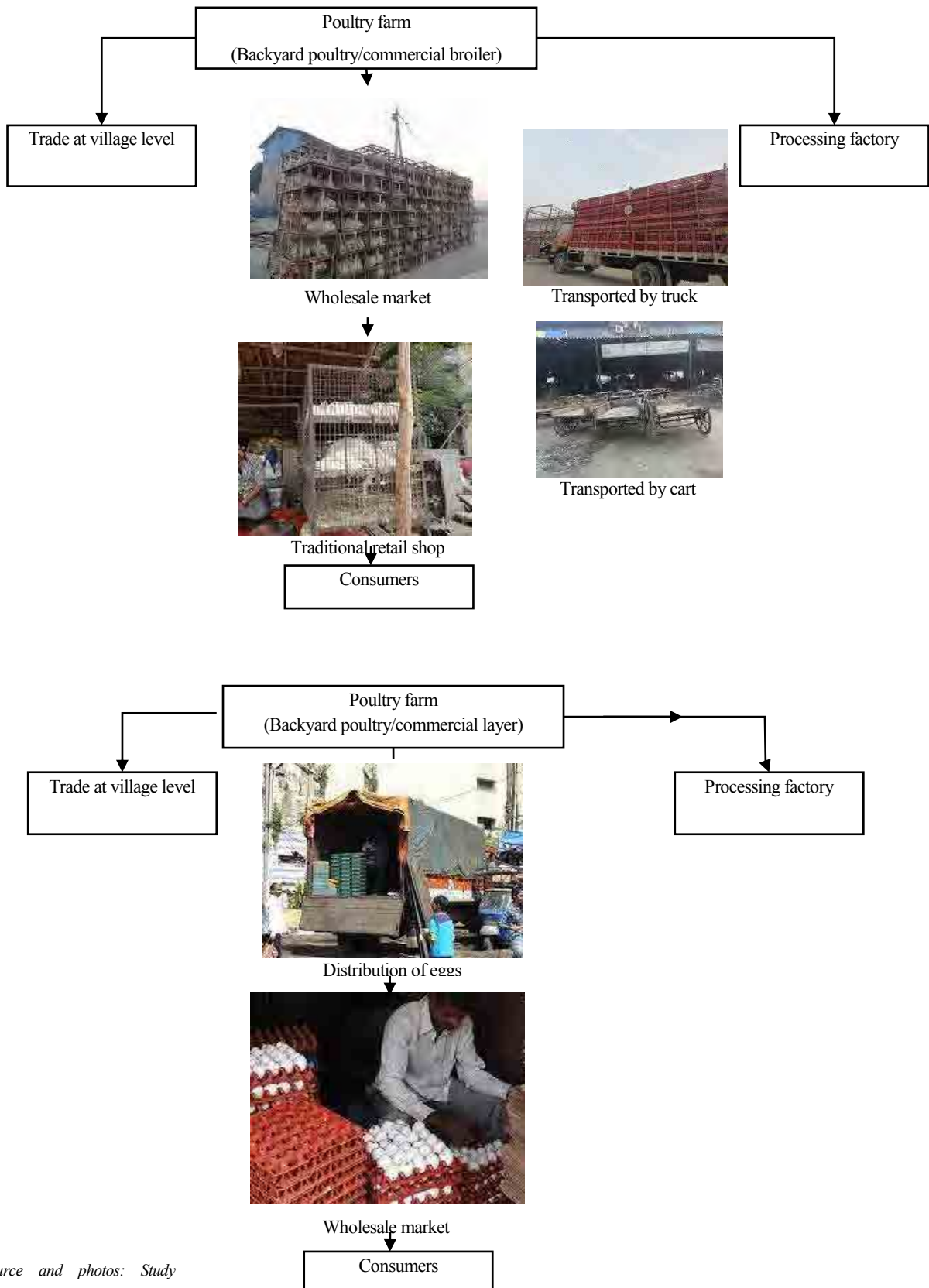
2) Meat (bovine and small ruminants)



Source and photos: Study

Figure 3-40: Supply chain for meat (bovine and small ruminants)

### 3) Poultry



Source and photos: Study

Figure 3-41: Supply chain for poultry

### (3) Stakeholder analysis

Tables 3-44, 3-45 and 3-46 summarize the problems/issues, major activities and related government organization for major stakeholders in the value chains of dairy, meat and poultry sectors respectively.

Table 3-44: Summary of problems, activities, and related government ministry for major stakeholders in the value chain for dairy products

Stakeholders	Major activities	Problems/issues	Related government organization
Farmers	Produce milk	<ul style="list-style-type: none"> <li>• Lack of access to market in rural areas</li> <li>• Lack of chiller facility</li> <li>• Lack of fodder</li> <li>• Low productivity</li> </ul>	Department of Animal Husbandry
Cooperative	Collect, pasteurize, process, pack, distribute and sell dairy products	Milk collecting center <ul style="list-style-type: none"> <li>• No electricity (no chiller facility) at collecting center, low penetration rate of chiller facility at milk collecting center</li> <li>• High price of machinery to check quality</li> </ul> Factory <ul style="list-style-type: none"> <li>• Seasonal fluctuation of milk production</li> <li>• Tractability of milk</li> <li>• Old facilities</li> </ul>	NDDDB, Department of Animal Husbandry
Private company	Collect, pasteurize, process, pack, distribute and sell dairy products	<ul style="list-style-type: none"> <li>• Seasonal fluctuation of milk production</li> </ul>	
Middleman	Collect milk and transport to shops or consumers	<ul style="list-style-type: none"> <li>• Unclear mechanism to determine price</li> <li>• Unhygienic conditions/adulteration</li> <li>• No chilling facility</li> </ul>	
Milk shop/bakery	Process and sell dairy products	<ul style="list-style-type: none"> <li>• Sometimes unhygienic conditions</li> <li>• No chilling facility</li> </ul>	

Source: Study team

Table 3-45: Summary of problems, activities and related government ministry for major stakeholders in the value chain for meat (bovine and small ruminants)

Stakeholders	Major activities	Problems/issues	Related government organization
Farmer	Rear animals	<ul style="list-style-type: none"> <li>• Lack of access to market in rural areas</li> </ul>	Dept. of Animal Husbandry
Middleman	Bring and sell animals at livestock market		
Butcher/public slaughterhouse	Slaughter animals		Municipal gov.
Private company	Procure, slaughter, process, chill/freeze, transport and export meat	<ul style="list-style-type: none"> <li>• Not enough quality animals</li> <li>• No backward linkage of animals</li> </ul>	

Wholesaler/ wholesale market	Sell meat to retailers	<ul style="list-style-type: none"> <li>• Unhygienic conditions</li> <li>• No chiller facility</li> </ul>	Municipal gov.
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Source: Study team

Table 3-46: Summary of problems, activities, and related government ministry for major stakeholders in the value chain of poultry

Stakeholders	Major activities	Problems/issues	Related government organization
Farmer	Rear poultry	<ul style="list-style-type: none"> <li>• Bird disease</li> <li>• Fluctuation of market price</li> </ul>	Dept. of Animal Husbandry
Transporter	Transport live poultry/egg to wholesale market	<ul style="list-style-type: none"> <li>• Poor road condition</li> </ul>	
Private company (processing)		<ul style="list-style-type: none"> <li>• Small processed food market</li> </ul>	
Wholesaler/wholesale market	Sell live poultry/egg to retailers		Municipal gov.
Retail shop/restaurant	Slaughter live poultry, sell or provide meat and eggs Provide meal		

Source: Study team

### 3.2.3 Evaluation of VC

- Fifty percent of fresh milk is consumed at village level. Thirty percent of it is sold through traditional distribution system and the remaining twenty percent is sold through modern distribution system. In the modern distribution system, 47 percent of products are distributed by dairy cooperatives, followed by 37 percent of private companies and 16 percent of government entities.
- The modern distribution system of milk by dairy cooperatives has functioned well. NDDDB has provided continuous assistance to those states where development of cooperatives is slow. However, most of facilities have outdated and needed to upgrade.
- Although there is a system to ensure traceability of milk from modern factories to consumers, it is not well established between farms and factories.
- The biggest issues in dairy sector is low productivity and high wastage. World Bank started assisting NDDDB to tackle these issues through National Dairy Plan.
- The meat export industry is well developed in terms of facilities and management. The issue is low quality of animals. However, the meat in India involves religious issues and the government is somehow hesitant to assist it. Thus it is considered difficult to assist it through ODA.

### **3.2.4 Need for assistance**

#### **(1) Dairy**

NDDB plays an important role in dairy development in India. India achieved self-sufficiency in milk production through Operation Flood from 1970 to 1996. In order to increase milk production to meet increasing domestic demand, the National Dairy Plan started in 2012/13 as a fifteen-year project. NDDB, the implementing body of the National Dairy Plan, seems capable of implementing this nationwide project based on the achievements of Operation Flood and other activities. Although all amounts applied by the Department of Animal Husbandry, Dairying and Fisheries are not always allocated by the central government of India, the central government of India seems capable of providing finance to states for major centrally-sponsored projects such as the National Dairy Plan. However activities at field level are carried out by state governments. Some states, especially backward states, may need technical assistance to implement a centrally-sponsored project as well as their own projects. Although NDDB provides technical assistance to those states, additional technical support may be needed for backward states. Government officers, other stakeholders and the JICA study team pointed out the following needs for assistance from Japan.

- Technical support to backward states to implement centrally-sponsored projects and their own projects
- Technology and financial assistance to install cooling facilities for chiller tanks for milk, semen, and vaccine using alternative energy such as solar
- Loans with low interest rate to improve cold chain, such as chiller vans and refrigerators at milk retail shops
- Economic milk processing facility to convert liquid milk into powder milk to overcome seasonal production gap of milk
- Economic machinery to check milk quality
- Loans with low interest rate for modernization of milk processing facility owned by cooperatives
- Technical training in Japan on quality control such as Kaizen and Sigma
- Technical assistance for clean milk project.

#### **(2) Meat (bovine and small ruminants)**

The meat sector is mainly led by the private sector. As mentioned in the previous section, India is the second largest beef-exporting country. Because of religious sensitivity and other reasons, assistance from the central government to the beef industry seems limited compared to assistance to the dairy sector. The following needs for assistance from Japan were pointed out by government officers, other stakeholders and the JICA study team.

- Technical assistance for quality animal and backyard linkage
- Technical assistance to eliminate FMD

- Technical assistance and loans for rearing calves
- Loans with low interest rate to improve meat industry.

### **(3) Distribution infrastructure**

Although highways and principal roads have been built rapidly, road conditions and connectivity of the distribution network in India needs to be improved.

- Technical assistance and loans to establish distribution centers which have storage, processing, assortment and cold/freezing facilities
- Technical assistance and loans to improve connectivity at container loading areas for railway transportation
- Technical assistance and loans to design and install an improved distribution network
- Loans to government for improvements to roads.

### **(4) Production control management**

Dairy plants and meat processing plants certified by ISO and HACCP are operated at international level. Although those plants practice production control management such as 5S and Kaizen, there is room for these to be improved from the Japanese point of view.

- Technical assistance for 5S, Kaizen, quality control and improvement of productivity.

## **3.3 Food Processing Sector**

### **(1) Trend of food processing industry in India**

The food processing industry in India accounts for 32 percent of the country's total food market in 2011<sup>40</sup>. The total value added of the industry is estimated to be worth USD121 billion in 2009-2010<sup>41</sup>. The industry employs 13 million people directly and 35 million people indirectly<sup>42</sup>. It accounts for 14 percent of manufacturing GDP, nearly 13 percent of India's exports and 6 percent of total industrial investment. The total value-added of the industry is currently growing at more than 10 percent per annum, and it is expected to reach USD194 billion by 2015<sup>43</sup>.

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<sup>40</sup> *Indo ni okeru kakoushokuhin ryutsu kouzou chousa, JETRO*

<sup>41</sup> *Indo no shokuhinkakougyou oyobi shokuhin kakou kikai sangyo no shijou hyouka, JETRO*

<sup>42</sup> *Indo ni okeru kakoushokuhin ryutsu kouzou chousa, JETRO*

<sup>43</sup> *Indo no shokuhinkakougyou oyobi shokuhin kakou kikai sangyo no shijou hyouka, JETRO*

Table 3-47: Market size of food sector in India (USD billion)

Sub-sector	2004/05	2009/10	2014/15 (projections)	Annual growth (2010/15)
Primary sector	73	118	153	5%
Milk products	28	44	62	7%
Meat	18	29	46	10%
Fruits and vegetables	18	28	40	7%
Packed products	6	9	15	10%
Beverage	4	7	10	7%
Bread	1	1	2	9%
Dried fruits	1	1	1	8%
Other	7	12	16	7%
Total	156	150	345	7%

Source : *Indo no shokuhinkakougyou oyobi shokuhin kakou kikai sangyo no shijou hyouka*, JETRO

Table 3-47 shows the trend of market sizes for each sub-sector of the food industry in India. One can see that milk, meat, and fruit and vegetables are major subsectors within the food processing industry. Also all the subsectors in the food processing industry showed a relatively high growth (more than 7 percent of annual growth) between 2004/05 and 2014/15.

The recent growth in food processing sectors can be attributed to growing urbanization, a rise in income and changing lifestyles, entry of international firms, and government impetus to develop this industry. Even though the industry has recently shown significant growth, it is still at a nascent stage and contributes only 1.49 percent to GDP.

Table 3-48: Percentage of value of processing activities across categories

Segment	India			World
	Organized	Unorganized	Total	
Fruit and vegetables	1.4%	0.8%	2.2%	USA 65%, Philippines 78%, China 23%
Milk and milk products	13%	22%	35%	More than 60% in developed countries
Buffalo meat		21%	21%	
Poultry		6%	6%	
Marine products		8%	8%	

Source: *Flavors of Incredible India*, Ernst&Young

Table 3-48 shows the percentage of value of processing activities across products in India compared to other countries. It shows that the penetration of processing activities is quite low in the global context. This is especially significant in the case of fruit and vegetables, where the processing level in India is a mere 2.2

percent. Also one can see a considerable proportion of processing activities are engaged in by unorganized players.

The food processing industry is, however, expected to grow in future. According to a report by the Federation of Indian Chambers of Commerce and Boston Consulting in 2011, the total value of the food processing industry in India is expected to reach USD300-350 billion by 2020.<sup>44</sup>

## **(2) Policy and promotion**

There is increased awareness among government officials of the need to uphold India's food processing sector. Policies for and promotion of the food processing sector by the Indian government include the following.

- *Vision 2015 Action Plan*: MOFPI has formulated a *Vision 2015 Action Plan* that includes raising the level of processing of perishables from 6 percent to 20 percent, increasing value addition from 20 percent to 35 percent, and enhancing India's share in global food trade from 1.5 percent to 3 percent.
- **Mega Food Parks**: The Government of India is actively promoting the concept of mega food parks, and expects to set up thirty such parks across the country to attract foreign direct investment. The government has released a total assistance of USD23 million to implement the Mega Food Parks Scheme.
- **Agri-Export Zones**: The government has established sixty fully-equipped agri-export zones (AEZs) to provide a boost to agricultural and food processing exports.

## **(3) Characteristics of players in the food industry**

Most of the food processing firms in India are small- and medium- scale and many of them are unorganized firms. There are few large-scale integrated domestic or international players. Yet these characteristics differ across the subsectors of the industry as the following shows.

### **a) Fruit and vegetables:**

The industry is fragmented with a large number of household and small sector units, having capacities of up to 250 tonnes per annum. Since 2000 there has been a significant increase in ready-to-serve beverages, pulps and fruit juices, frozen fruits and vegetable products, mainly driven by export demand.

### **b) Beverages:**

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<sup>44</sup> *Indian Food Processing: Mission 2020*, BCG and FICCI, November 2011.

India is considered to be the third largest market in the world for alcohol and has around fifty-six manufacturing units. In the case of non-alcoholic drinks, there is a high presence of organized Indian and international players.

#### **c) Milk and milk products**

About 35 percent of the total milk produced in India is processed. The organized sector processes about 13 million tonnes per annum while the unorganized sector processes about 22 million tonnes per annum. In the organized sector, there are more than 600 dairy plants in the cooperative, private and government sectors, registered with government and state governments.

#### **(4) Problems and issues**

The following depicts the problems/issues faced by the food processing industry, according to existing literature.

##### **a) Absence of economies of scale**

Increase in farm processing output is highly dependent on economies of scale from procurement and logistics. As the processing activity is highly scattered in India, achieving economies of scale to increase output has been limited.

##### **b) Impaired access to credit**

Processing activity generally involves purchasing the input products during harvest time. Due to the lack of available timely credit small processors often cannot meet their working capital requirements, and have to purchase less raw material and thus produce less.

##### **c) Logistics challenges**

Most of the processors cannot create their own infrastructure for logistics and rely heavily on common facilities such as grading and packaging, cold storage, warehouse facilities, customized transportation, logistics parks and integrated supply solutions. This hinders the timely procurement of raw materials.

##### **d) Seasonality of raw materials**

As the industry is based on agricultural and horticultural products, the seasonality of raw material makes it necessary for firms to hold a large amount of inventory. This increases investment in inventory-holding facilities on the premises and also blocks capital, which is already scarce for most small- and medium-size firms in the industry.

**e) Quality issues**

While the quality norms and measures for domestic and international trade have been set out for processed food, many processors, especially small-scale firms, lack the necessary monitoring mechanisms to implement the quality norms. This results in exports being rejected and returned to India due to non-compliance with the specified quality norm.

**f) Lack of adequately-trained manpower**

With a lot of development happening in the food processing sector, emerging shortages of specific skills can potentially damage the competitiveness of the industry. The impact will be more severe on the smaller processors as investment in training and human resource development is usually minimal. Not enough institutes are providing proper training for the industry.

## 4. Cases of AVC

### 4.1 Private Sector

#### 4.1.1 Indian companies

##### (1) Horticulture

The private sector is actively involved in the agriculture industry, though progress of processing is slow and the domestic market is yet to mature, contributing only 1.5 percent to total GDP. The major agricultural products manufactured in India are listed in ANNEX 1, but below are some examples of the private companies visited during the field survey.

- **SAFAL** <http://www.motherdairy.com/MotherDairyPages/branddetailpage.aspx?HLID=7>

Safal has the largest organized retail network for fruit and vegetables in India. Currently it operates over 400 retail outlets in the National Capital Region. Safal is owned by Mother Dairy, which is a subsidiary of NDDB. Safal was started in 1988 as a Government of India initiative to benefit fruit and vegetable producers and urban consumers. The task was assigned to NDDB as they had similar experience in the related sector of milk (see below). Safal's supply chain covers sixteen states, about 50,000 farmers and over 200 farmer associations with contract farming. The frozen products are also exported overseas.



Source (Photos also): SAFAL presentation

- **Srini Food Park (Pvt) Ltd (Hydra International Ltd, Japan)**

The company owns and operates Srini Food Park, which is equipped with comprehensive processing facilities with support from the AP state government with MEFS. It also has two pack houses in the state.

The main products are processed mango (frozen cut, purée, juice) and tomato (purée, paste, etc.), which are exported. The raw materials are procured from contract farmers in surrounding areas or dealers who collect fruit from smallholders. The company has a representative office in Japan for making mainly mango products. It has quality certifications such as ISO and HACCP.



Photos: Study Team

- **Sam Agritech**     <http://www.samagri.com/>

Sam Agritech is a company with operations in farming, processing and marketing of agricultural products, mainly pomegranates, grapes, mangoes, coconuts, melons and exotic vegetables, to various international markets (UK, Middle East and South-East Asia). It specializes in processing and exporting ready-to-eat fruit and vegetables. The company contracts with eight large-scale farmers in AP and Maharashtra in order to meet tractability needs from overseas clients. It plans to have an extension factory in Srimi Food Park in 2015.



Photos: Study Team

- **Jain Irrigation** <http://www.jains.com/>

Jain Irrigation is a multi-product industrial manufacturer which produces various pipes, polypropylene piping systems, plastic sheets, green houses, and agro processed products such as dehydrated onions and vegetables, processed fruits (purees, concentrates, and juices). The firm is the second largest producer of micro irrigation products and the biggest producer of mango purees in the world. The firm owns two septic horticulture processing plants in Chittoor, AP where they mainly process mango and tomato. 60 percent of the mango products they process is sold to Coca Cola, and the rest of it is exported to various processors.



Photos: Study Team

- **ITC Limited** <http://www.itcportal.com/>

ITC is one of India's foremost multi-business enterprises with a market capitalization of USD 40 billion and a turnover of USD 8 billion. The company is involved into traditional and green-field businesses encompassing Fast Moving Consumer Goods (FMCG), hotels, paperboards and specialty papers, packaging, agribusiness, and information technology. Although the company had just started spice business in 2004, the company has been expanding the spice business based on their more than 100 years of history in agribusiness. The agri-business division office of ITC is located in Guntur, AP, because of good production of tobacco and chili. The company procures about 20,000 tonnes of spice annually. The detail of their spice business is introduced in Chapter 5.



Photos: Study team

- **Synthite Industries Limited** <http://www.synthite.com/synthite.html>

Synthite Industry Ltd. is the third largest oleoresin extraction company in the world, and the largest in India; it produces 30 percent of world oleoresin. They have a headquarters in Kerala and processing units in six different places, including Guntur in AP. The detail of their chili business is introduced in Chapter 5.

## **(2) Dairy/Livestock**

### **a) Dairy**

Private companies can be categorized as: i) private company in general, and ii) private companies under cooperative societies. Currently the capacity of processing facilities under category i) is larger than that of category ii). The major companies in each category are briefly introduced below.

#### **i) Private company**

- **Nestlé India Limited** <http://www.nestle.in/>

Nestlé India has eight manufacturing facilities and four branch offices across India. Nestlé India set up its first manufacturing facility at Moga (Punjab) in 1961, followed by its manufacturing facilities at Choladi (Tamil Nadu) in 1967, Nanjangud (Karnataka) in 1989, Samalkha (Haryana) in 1993, Ponda and Bicholim (Goa) in 1995 and 1997 respectively, and Pantnagar (Uttarakhand) in 2006. In 2012 Nestlé India set up its eighth manufacturing facility at Tahliwal (Himachal Pradesh). The four branch offices, located in Delhi, Mumbai, Chennai and Kolkata, help facilitate sales and marketing activities. Milk procurement by the company reached 375,000 tonnes in 2012.

#### **ii) Private company under cooperative**

- **Mother Dairy** <http://www.motherdairy.com/>

Mother Dairy is based in Noida, Uttar Pradesh; it was set up in 1974 as a wholly-owned company of the National Dairy Development Board (NDDB). Mother Dairy manufactures, markets and sells milk and milk products under the Mother Dairy brand (milk, cultured products, ice cream, panir and ghee), the Dhara range of edible oils, Safal range of fresh fruit and vegetables, frozen vegetables, processed fruit and vegetable products, fruit pulp and concentrates in bulk aseptic packaging, and fruit juices at a national level through its sales and distribution network for marketing food items.

- **Gujarat Cooperative Milk Marketing Federation Ltd. (GCMMF)** <http://www.amul.com/>

GCMMF is India's largest food product marketing organization with an annual turnover (2013/14) of USD3.0 billion. Its daily milk procurement is approximately 13.18 million liters per day from 17,025 village

milk cooperative societies; it has seventeen member unions covering thirty-one districts, and 3.23 million milk producer members. The Anand Pattern of dairy development is a three-tiered structure with the dairy cooperative societies at village level federated under a milk union at district level and a federation of member unions at state level.

#### **b) Meat (bovine and small ruminant)**

<http://www.meat-ims.org/groups/all-india-meat-livestock-exporters-association-aimlea/>

Meat exporters organize the All India Meat & Livestock Exporters Association (AIMLEA). It was formed in 1972, has headquarters in South Mumbai and over sixty active members. AIMLEA supports the efforts of the APEDA and the Ministry of Commerce, Government of India in the export of risk-free, frozen/chilled buffalo meat and sheep/goat meat from India.

Major meat exporters are briefly explained below.

- **The Allana Group** <http://www.aiaims.com/ourpatrons.aspx>

The Allana Group is acknowledged as the world's largest exporter of frozen halal buffalo meat. The head of the group is respected by his competitors and is in his seventh term as President of AIMLEA. The association has sixty-five members comprising about forty companies who have slaughtering and packing facilities, several companies who have packing facilities, and about ten trading companies. The total volume exported by member companies contributes about 90 percent of total export volume of bovine and small ruminant meat.

- **Hind Agro Industries Limited**

Hind Agro Industries Limited is the first company in India to have Asia's most modern abattoir-cum-meat-processing plant at Aligarh in Uttar Pradesh. It is a joint venture of Hind Industries Limited, Govt. of Uttar Pradesh and assisted by the Government of India. The company currently has four plants in India and slaughters 4,000 buffalo per day. The company established a non-profit organization, Hind Livestock Development Foundation, to support farmers who rear buffalo for meat. The company provides assistance to the farmers by supplying feed and veterinary services from its experts.

#### **c) Poultry**

The Poultry Federation of India (PFI) is an association committed to serving producers and processors of turkey, chicken, quail, squab and egg products. The PFI provides a united voice for the industry with government, media and the general public.

<http://www.pfindia.org/>

## **4.1.2 Japanese companies**

### **(1) Manufacturers**

There are a limited number of Japanese food manufacturers operating in India. Although many Japanese companies see a huge potential in the Indian food market, most of them think that it is too early to invest in India, as processed food is not widely accepted and its market size is rather small. Besides the high import duty, new regulations on labelling introduced by Indian authorities prohibit interested companies from testing their products with temporary labels in the market.

Consequently there are only three or four Japanese food manufacturers in India, including Nisshin, Yakult and Ajinomoto. Kagome, a major tomato and vegetable processed food manufacturer in Japan, has recently started operating in India. In 2013 it set up a joint venture company to produce tomato-based processed foods in collaboration with a Japanese trading company, Mitsui, and an Indian food company, Ruchi Soya, and will open its own factory in Maharashtra in 2015.

Aiming to contribute to alleviating malnutrition among the poor population, it has also conducted a study supported by JICA to develop and market vegetable juice for the urban middle class as well as carrot jam for the low-income population. Although vegetable juice is new in India, they think it possible to attract the interest of the urban middle class as they become more aware of health issues and they are used to drinking fruit juice. They have found it difficult to sell carrot jam to low-income people in a commercially-viable way. The company is thinking of cross-subsidizing losses from the carrot jam business with profits from the vegetable juice business.

The company points out that a major constraint for the food processing company in India is price fluctuation of raw materials. It is especially serious for tomato as its price fluctuates regularly; this results in high wastage as farmers give up trying to sell if the price falls dramatically. Large price fluctuations make contract farming extremely difficult as most farmers ignore the contract if the market price exceeds the contract price, and there is no enforcement mechanism to make a farmer follow the contract. They point out that the fact that most farmers are not organized is a reason for their tendency to react to market changes. For this reason the company plans to source most of its raw material only from large-scale farmers who can ensure a stable supply. They are looking for reliable farmers through their network of seed companies and primary processors.

### **(2) Trading companies**

Almost all major Japanese trading companies have an office in India and have a dedicated section for dealing with agricultural produce or food. However their food-related business has mostly focused on grain and the overseas market due to low demand as well as difficulty in doing business in the domestic market, especially for fresh fruit and vegetables. An overview of their activities is given below.

## **1) Grain**

Grain trading is currently a major part of food-related business for most Japanese trading companies. They procure grains such as soybean meal, rice, wheat and maize in the Indian domestic market, and export them to Japan and other Asian countries. Normally they only export and do not import. Although Japanese trading companies have been involved in developing a supply chain of food grains by investing in companies who own storage and logistics infrastructure in North America or Australia in order to secure food resources in bulk for sales, this strategy may not be applicable in India as the supply chain in India is fragmented and there is tight regulation of trans-state movement of agricultural produce.

Some companies see a business chance in production of grain. As rice is a staple food in Japan, production, inputs and machinery specialized for rice cultivation are well developed in Japan. Sumitomo, for instance, partners with Kubota, one of the biggest Japanese agriculture machinery manufacturers, to introduce rice planting machines along with fertilizers and other inputs. They think that there might be a possibility of procuring rice and processing it for export to Japan in future.

Mitsubishi sees the trend in the domestic grain market changing from bulk trading to trading in small packages. They think that a business opportunity for primary food processing, such as rice polishing, flour milling and processed beans, will materialize soon and are looking for a local partner.

## **2) Fresh fruit and vegetables**

Many companies see high potential for exporting fresh mangoes. Although some companies tried to export them to Japan, they gave up due to strict quarantine regulations for fresh fruits in Japan. Due to tight regulations on food exports in India, export of fresh fruit and vegetables is not easy and thus has not materialized yet.

## **3) Processed food**

In South-East Asia, where major Japanese retail companies operate, Japanese food manufacturers supply food products to their retail shops. However there are restrictions on foreign retailers investing in India. In addition processed foods have not been widely accepted in India. Consequently there are limited numbers of Japanese food manufacturers currently operating in India which include Yakurt, Nisshin Foods, Ajinomoto and Kagome.

However, this trend begins to change. In other countries Japanese trading companies partner with Japanese food manufacturers and local companies to set up joint venture businesses. In India Mitsui Co. Ltd. announced to invest in Global Beverages & Foods Private Limited along with Goldman Sachs<sup>45</sup>. It is looking to build a portfolio of consumer brands in juices, confectionaries and snacks. Mitsui intended to introduce Japanese

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<sup>45</sup> <http://www.livemint.com/Companies/DiTz6WPxrxdbEcAdmeI9ML/WMahendran.html>

food products through the marketing channel of the newly established company<sup>46</sup>. Marubeni sees growing potential for Japanese foods such as bakery and noodles as the urban middle class expands. By utilizing its extensive relationship with local food manufacturers, Marubeni tries to attract Japanese food companies to start their business in India. It has supported market surveys for companies such as Calbee, Nichirei, SB food and Morinaga. It has also exported Indian processed foods such as mango purée, banana purée and tomato paste to Japan.

#### **4) Logistics and cold chain**

Mitsubishi Co. Ltd. invested in Snowman, the nationwide logistics company in India, in 1998. It has a ten percent stake in the company and a member on the board. It has its own nationwide cold chain network covering sixteen major cities. Due to deregulation of the modern retail and food service industry in the middle of the 2000s, its business started to expand. Its annual turnover increased five-fold between 2010 and 2014. Its major clients include Coca Cola, Metro, Subway and KFC. However its network does not cover rural areas due to the lack of necessary infrastructure, and thus fresh fruit and vegetables are mostly out of its service. As cold chain delivery is a high-cost service it limits its clients to major highly-reputable companies, and its service to high-value products such as pharmaceuticals and sweets such as ice cream.

Many Japanese companies see a clear need for a cold chain service and they are getting more interested in the sector. In February 2015, Marubeni announced its interest in investing in logistic business in India through collaboration with food companies in India.<sup>47</sup> Maekawa Manufacturing Company, a leading manufacturer of industrial refrigeration compressors in Japan, shows its keen interests in setting up a new factory in India to supply their products to the growing market for cold chain facilities.

#### **4.2 Successful case of AVC in India**

As observed in Chapter 3, the major obstacle to realize a high return to the farmers is the high complexity of the traditional unorganized supply chain system, while it is sometimes observed efficiently in the way that it ensures swift and timely delivery of food products to consumers. In India, there have been a number of attempts to overcome the obstacles and to bring maximum benefit to farmers, some of which are quite successful. In this chapter, some successful cases of AVC in India, which brings direct linkage between farmers and markets, are introduced.

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<sup>46</sup> The article on Nekkai newspaper on 18 February 2014

<sup>47</sup> The article on Nikkei newspaper on 19 February 2015 (<http://www.nikkei.com/article/DGXXKZO83382500Y5A210C1FFE000/>)

#### 4.2.1 Grape AVC in Maharashtra

India produced more than 2.4 million tonnes of grapes from 0.11 million ha in 2012-13, but 8 percent of that was exported<sup>48</sup>. In a global context, India is a small producer of grapes, with a global share of less than 2 percent. However, grapes are one of India's important fruit exports, with a 9.1 percent share in all fruit and nut exports, and its export value reached about INR14 billion in 2012-13<sup>49</sup>.

The commercial production of grapes started in India only after seedless varieties were introduced in Maharashtra during the 1960s. Varieties grown include Thompson Seedless, Sonaka, Sharad Seedless and Tas-e-Ganesh. The export of grapes started in the late 1980s. By the late 1990s, the export market for fresh grapes (which had previously been in Gulf countries) shifted significantly to the EU, accounting for 60 percent of the market. 99 percent of the total export is from Maharashtra, and it makes Maharashtra the leading state of quality grape production. There are various factors behind the success of the grape export in Maharashtra, such as the presence of progressive farmers who took marketing initiatives and the presence of strong governmental and political support for the initiatives. One example of such an initiative, Mahagrapes, is introduced below.

##### **(1) Mahagrapes initiative<sup>50</sup>**

A major problem in the export of horticulture products in general and grapes in particular is that it is conducted mostly by a large number of small farmers. Owing to their limited resource base and lack of collective bargaining power, they cannot compete with large scale organized growers abroad. Some progressive grape farmers from Maharashtra overcame this problem by linking themselves to 'Mahagrapes' through cooperatives. Mahagrapes acts as a marketing partner for 16 farmer cooperatives. It was formed in 1991 with the objective of the elimination of middlemen in the marketing process, and also for promoting agricultural exports.

In the beginning, Mahagrapes had 20,000 farmers who are the members of 29 grape growing farmer's cooperatives. This number came down within three years, and currently there are 16 farmer cooperatives comprising of 2,500 grape farmers. They export more than 400 tonnes of grapes annually. The volume has decreased from about 2,000 tonnes in 2006, but it indicates that as time passed the members started to move on and found their own marketing channels through the capacity attained with membership. According to a survey 51 farmers who are the members of Mahagrapes have a higher yield and also earn higher revenues per acre of grape land.

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<sup>48</sup> Horticulture Database 2013

<sup>49</sup> [www.apeda.go.in](http://www.apeda.go.in)

<sup>50</sup> Information in this section is acquired by the interview with the Mahagrape by the Study Team.

<sup>51</sup> World Development Journal "Success in High Value Horticulture Export Market for Small Farmers" Devesh Roy and Amit Thorat

The success of the initiative is an unprecedented case in the country as it was developed with joint and concerted efforts of farmers and the state government. Mahagrapes was established by some progressive farmers and their cooperative societies, and the primary source of funding is membership equity. The government did not provide any explicit assistance to Mahagrapes in its establishment. However, the state government agencies played an important role to support its functioning and development, as described in below.



Photos: Mahagrapes website <http://www.mahagrapes.com/> and Study Team

## **(2) Factors of success**

### **1) Farmers' initiative**

It had started solely as a farmers' initiative. Maharashtra has a long history of cooperative activity which is more active than that in other states. There were many active cooperative societies for traditionally important crops such as cotton and sugarcane. There were several grape producer organizations and very progressive grape farmers in the area. Mahagrapes was established by cooperatives, led by some of those farmers who studied the overseas market and understood the marketability and potential of their products. The group of cooperatives made use of a special provision which became available after the amendment of the cooperative laws of the state. This amendment, established in 1984, allowed cooperatives to associate with other agencies including marketing partners. Such an association was forbidden prior to the amendment. Mahagrapes was registered as a marketing partner to the producer cooperatives under the amended cooperative law of the state. Mahagrapes has been owned solely by the member farmers as they have collectively contributed their share in the fixed and operation costs of Mahagrapes and it is governed by the member farmers. These factors make the work of the organization smooth and effective.

The challenge Mahagrapes faced was the diseconomies of scale, as the majority of the members are small scale. Since collecting information and negotiation of contracts involves economies of scale, Mahagrapes has undertaken these activities on behalf of the farmers, and it purchased inputs in bulk (like import

fertilizers). With this activity, each cooperative could purchase their inputs with much cheaper price. Mahagrapes also disseminated information on market requirements for member farmers free of cost. This was followed by training on food safety and field demonstrations. Mahagrapes has continuously updated the list of banned and approved pesticides and fertilizers and distributed a handbook including this information to the farmers. Individually acquiring a EuroGAP certificate is costly for small and medium farmers. However, Mahagrapes has managed to provide necessary training and financial assistance to all of the cooperative societies for Euro GAP certification. These kinds of collective activities empowered each grape farmer.

## **2) Governmental support**

Though Mahagrapes is an autonomous organization, the support from government entities such as MSAMB was indispensable for its establishment. MSAMB is a unique organization as it has put emphasis on promotion of horticulture crops while the marketing department of the Ministry of Agriculture in other states generally focuses only on food grains. MSAMB is different from the marketing department in other states as it is staffed with not only by the Ministry of Agriculture but by various state departments. This organizational structure enables MSAMB to conduct comprehensive and flexible interventions for marketing promotion. For supporting Mahagrapes, MSAMB organized a team with all related authorities such as the Department of Horticulture, the Department of Cooperation, and APEDA under one umbrella and the staff from different authorities extended support with their own capacity.

The initial time periods were characterized by difficulty for Mahagrapes, resulting from high rates of consignment rejections in the European markets. However, Mahagrapes has learnt how to minimize potential risks such as unstable chemical residue and quality standards (berry size, color, blemish, pest damage, etc.) and rejection rates have gone down substantially. In the initial periods when consignment rejections occurred, the government stepped in with soft loans to the cooperatives to help set up a pre-cooling and cold storage infrastructure as well as training on international food safety standards. As a result, shipment rejections were reduced to less than one percent after 2001.

APEDA also played an important role on marketing and promotion of their grapes in the overseas market. It provides support for Mahagrapes members to participate in trade fairs and to print promotional materials. It also provides subsidies to cover some percentage of the freight charge for export their products.

## 4.2.2 Gherkin AVC in Karnataka<sup>52</sup>

Gherkin is a variety of small size cucumber, which is usually used as a kind of pickle. Today India has emerged as the origin of the finest gherkin cultivation, processing and exporters to growing world demand. Although India is a traditional producer of cucumber, its export potential was discovered during the late 1980s. When the cost of production of gherkins in Europe became too high, farmers in India seized upon this opportunity to produce gherkins. The full-fledged exports started in India during the early 1990s with a modest beginning in Karnataka and later extended to the neighboring states of Tamil Nadu and AP. India exported 251,182 tonnes of gherkins, worth INR 12 billion during the year 2014-15, with major destinations being Russia, US, France, Belgium and Spain. Karnataka accounts for about 70 percent of gherkin production and leads in exporting preserved gherkins with a share of more than 90 percent in total export.

### (1) Contract farming

Gherkin cultivation in India is unique as it is cultivated exclusively on a "contract farming" basis. This industry, which has showcased the true and successful model of contract farming, with which the industry is able to have good quality control over the final produce as per the requirements of the international market. Currently, 47 companies are involved in the industry as shown in the table below.

Table 4-1: Socio Economic footprint of the gherkin industry (2014-15)

	Karnataka	AP	Tamil Nadu	Total
No of companies	28	4	15	47
Area (Acres)	43,000	6,600	16,600	66,200
Production (tonnes)	130,000	20,000	50,000	200,000
No of farmers	86,000	13,200	32,300	131,500

*Source: Indian Gherkin Exporters Association*

Global Green Group, one of the largest companies among 47 companies currently operating in the country, is conducting business with contract farming. The company makes contracts with 20,000 farmers and the majority of them are small farmers with an average land size of 0.75 acres. The price is set based on the crop size and agreed with farmers before sowing through a written agreement. All inputs and cash advances are supplied to the farmers for successful cultivation of the crop. This helps to control inputs as per regulations in the US and EU. There are 120 well qualified and trained field staffs who are monitoring cultivation and providing instruction to the farmers to ensure grade structure and quality. The crop is culled,

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<sup>52</sup> Information in this section is acquired by the interview with the Indian Gherkin Exporters Association and field visit by the Study Team.

graded and weighed in front of the farmers, which forms the basis of the payment. The payment is settled in 10-15 days with an efficient data processing system developed by the company. The company also has efficient logistic operation, ensuring last minute pick up to preserve quality. The average income the farmers get for gherkin production is INR 100,000 per acre (2 cycles in a year), which is more than what is earned for cultivating other crops in the region.

Although no quantitative analysis was made on the impact of the contract farming on farmers' lives, many reports indicated that the living standards and social capacities such as communication skills and organizational participation of the farmers in the area were improved.



The price is determined based on the size of the crop



Cultivation is monitored with a pass book. Instruction with pictures is included in the book.

*Photos: Study Team*

**(2) Factors of success**

Gherkin production is suitable for small farmers as the crop is labor intensive. It creates family employment throughout the crop period and hence reduces migration of family members to urban areas or other states. Besides, the crop starts bearing fruits early (35 days after sowing and continues for the next 30 days. 2-3 crops are possible in a year), and thus yields quick returns.

Contract farming is generally not very successful in India to date. The reason for the unusual success of contract farming of gherkin is the lack of a domestic market. As almost 99 percent of the products are exported, production can be done under a controlled environment and the price fluctuation is not as serious as other crops. The contract farming offers farmers advantages of reduced capital investment, reduced risk of price fluctuation, guaranteed returns and provision of technical assistance from the companies. Also for the companies, there is no risk that the contract farmers sell the products to other markets which offer a higher price, and therefore they can get a stable supply.

The role of the government to promote the gherkin industry has not been significant as it was mainly led by the private sector. APEDA is providing an export subsidy to cover shipments, and the Ministry of Commerce and Industry is providing a tax incentive in the form of the Vishesh Krishi Gram Udyog Yojana scheme. These measures have a certain effect to improve the efficiency of the export of products. However, more governmental support will be required to improve productivity which is lower than that of competitors. The average yield of gherkin in India is 3.5 tonnes per acre, while it is 10 tonnes in Turkey and 12 tonnes in Vietnam. Besides damages of crops by pests become serious these days. The government support for research and development of new varieties suitable for Indian conditions and technology development for pest management are required for further development of the industry.

## 5. Outcome of Detailed Value Chain Survey

### 5.1 Framework of Detailed Value Chain Survey

#### (1) Objectives

To understand in detail the present condition and bottlenecks in AVCs, in order to propose the direction for future assistance from JICA for AVCs in India.

#### (2) Priority states

Three priority states were selected for the detailed VC survey, based on three categories of criteria: development impact, ease of implementation and Japanese comparative advantage. For development impact, priority is placed on the benefit to small and marginalized farmers. The advantages of Japanese assistance, and the priorities and capacity of the relevant state government, are also considered in order to maximize the effectiveness of assistance.

Table5-1: Possible criteria for selecting priority states and crops

Category	Criteria
Development impact	<ul style="list-style-type: none"> <li>➤ Large production volume or production area</li> <li>➤ Large population involved in AVCs including processing</li> <li>➤ High participation of small and marginalized farmers</li> <li>➤ High potential for processing and value addition</li> </ul>
Ease of implementation	<ul style="list-style-type: none"> <li>➤ Favorable regulatory framework, infrastructure and investment climate of the state</li> <li>➤ Priority of the state</li> <li>➤ Capacity of the state government</li> </ul>
Japanese comparative advantage	<ul style="list-style-type: none"> <li>➤ Previous assistance record</li> <li>➤ Strengths or advantages of Japanese technology</li> </ul>

Source: Study Team

AP, Telangana and Odisha were chosen after careful consideration between the Study team and JICA. AP was selected to represent a progressive state while the other two were selected with more consideration to poverty alleviation, as these two states have a higher poverty rate than AP. JICA is currently providing assistance to irrigation projects in all three states, and the expected VC project can collaborate with these for synergy effects.

Table 5-2 Priority states

Priority states	AP	Telangana	Odisha
Development impact	<ul style="list-style-type: none"> <li>● The largest producer of tomato and chili, and second largest for mango</li> </ul>	<ul style="list-style-type: none"> <li>● The second largest producer of turmeric, third largest producer of fruits</li> <li>● High rural poverty relative to AP</li> </ul>	<ul style="list-style-type: none"> <li>● Second largest producer of eggplant and cabbage</li> <li>● High rural poverty</li> <li>● High outflow of rural population from the state as migrant laborers</li> </ul>
Ease of implementation	<ul style="list-style-type: none"> <li>● High priority on agriculture and food processing</li> <li>● High government commitment</li> <li>● Favorable investment climate</li> </ul>	<ul style="list-style-type: none"> <li>● High priority on horticulture and food processing industry</li> </ul>	<ul style="list-style-type: none"> <li>● High priority on agriculture, especially horticulture</li> </ul>
Japanese comparative advantage	<ul style="list-style-type: none"> <li>● Receiving a lot of Japanese investment</li> <li>● Receiving a lot of JICA assistance</li> <li>● Possibility of collaboration with ongoing irrigation project and 'Bangalore-Chennai Industrial Corridor' project</li> </ul>	<ul style="list-style-type: none"> <li>● Possibility of collaboration with ongoing irrigation project</li> </ul>	<ul style="list-style-type: none"> <li>● Possibility of collaboration with ongoing irrigation project</li> </ul>

Source: Study team

### (3) Selection of priority crops to be surveyed

Priority crops were selected in consultation with the state government, based on the criteria listed below.

- High potential for export
- High volume of production
- Various products after processing, as with coconut
- Produced by small farmers
- Other considerations for agricultural and industrial development in the state.

Out of the four or five crops proposed by the state government, two or three crops were selected for the detailed survey after consultation with JICA. The selected priority crops and their characteristics are listed below.

Table 5-3 Priority crops

Criteria	AP			Telangana		Odisha		
	Mango	Tomato	Chili	Turmeric	Mango	Mango	Cashew nut	Ginger
Districts considered for detailed study	Chittoor & Krishna	Kurnool & Chittoor	Guntur & Prakasam	Nizamabad & Adilabad	Rangareddy & Mahabubnagar	Koraput & Rayagada	Koraput & Malkangiri	Koraput & Kandhamal
High potential for export	Export value of mango in 2013/14 was INR9,200 million; this was second highest after grapes.	Export value of tomatoes was INR5,880 million, second highest after onion.	Export value of chili was INR27,222 million, highest in spices	Export of turmeric was INR6,667 million.	Export of mango in 2013/14 was INR9,200 million, second highest after grapes.	Export value of mango in 2013/14 was INR9,200 million, second highest after grapes.	Export value of cashew nut was INR6,830 million.	Export value of ginger was INR2,561 million.
High volume of production	AP is the second largest producer of mango in India.	AP is the largest producer of tomato in India.	AP is the largest producer of chili in India.	Telangana is the second largest producer of turmeric in India.	Telangana is the fourth largest producer of mango in India.	Odisha is a major producer of mango in India.	Odisha is the third largest producer of cashew nut in India.	Odisha is a major producer of ginger in India.
Many products after processing	Jam, juice, jelly, squash, pulp, concentrate, pickle and puree, mango bar, chocolate, dehydrated mango slices	Tomato paste, ketchup, sauce, chutney, pickle, powder, dehydrated tomato	Curry powder, chili powder, oleoresin, color extraction, pickle, chutney, paste, ingredients of pharma and cosmetic products	Jam, juice, jelly, squash, pulp, concentrate, pickle and puree, mango bar, chocolate, dehydrated mango slices	Jam, juice, jelly, squash, pulp, concentrate, pickle and puree, mango bar, chocolate	Jam, juice, jelly, squash, pulp, concentrate, pickle and puree, mango bar, chocolate, dehydrated mango slices	Roasted, salted and coated nuts, kernel, squash, shell liquid	Dry ginger, ginger powder, paste, pickle, oleoresin, oil, ingredients of pharma products

Source: Study team

#### (4) Detailed VC survey

A detailed VC survey was conducted for selected crops in the selected states. The outline of the survey is shown below. The survey consisted of two parts. First, our Indian partner (CHANGE) conducted a detailed VC survey between December and February 2015. Based on the outcome of this survey, a Japanese expert team visited India in March 2015, verified the study outcomes, discussed possible assistance with various stakeholders, and proposed the direction of future assistance by JICA on AVCs.

Table 5-4 Outline of detailed VC survey

Item		Contents
Period		December 2014 – March 2015
Survey area		AP, Telangana and Odisha
Crops studied		<ul style="list-style-type: none"> <li>➤ AP: Mango, tomato and chili</li> <li>➤ Telangana: Mango and turmeric</li> <li>➤ Odisha: Mango, ginger and cashew nut</li> </ul>
Content of survey	Survey by Indian partner (December-February)	<ul style="list-style-type: none"> <li>➤ Value chain study on selected crops               <ul style="list-style-type: none"> <li>• VCs of fresh crops</li> <li>• Value addition and processing</li> <li>• Infrastructure and supporting system</li> </ul> </li> </ul>
	Survey by Japanese mission in March	<ul style="list-style-type: none"> <li>➤ Verification of survey results</li> <li>➤ Discussion on possible assistance</li> <li>➤ Discussion on next steps</li> </ul>

Source: Study team

In June 2015, the Study team conducted another field survey in AP to collect additional information and upgrade the proposal. It is because the value chain infrastructure is well developed in AP and it is considered easier to formulate the concrete proposal for VC assistance which can be applied to other states. The results of the detailed survey and suggestions for AP can partly be applied also to Telangana and Odisha.

The Terms of Reference for the detailed VC survey is provided in ANNEX 5.

**5.2 Priority state 1: Andhra Pradesh (AP)**

**5.2.1 Overview of the state**

**(1) General overview<sup>53</sup>**

AP is situated on India’s south-eastern coast. On June 2014, the north western part of AP including its capital Hyderabad was separated as a new state called Telangana after a long movement of establishing a separate Telangana state.

Present AP is the eighth largest state in India, covering an area of 160,205 km<sup>2</sup>. With 49,386,799 inhabitants, the state is the tenth largest by population dropping from fifth before bifurcation. AP has the second longest coastline of all the states of India - 972 km, second only to Gujarat.



Source: AP state portal (<http://www.ap.gov.in/districts/>)

Figure 5-1 Districts of AP

There are thirteen districts. Visakhapatnam is the largest city and a commercial hub of the state, with a GDP of USD 26 billion, followed by Vijayawada with a GDP of USD 3 billion. A new capital city for AP is

<sup>53</sup> This section is written based on information collected from AP state portal and Wikipedia ([http://en.wikipedia.org/wiki/Andhra\\_Pradesh](http://en.wikipedia.org/wiki/Andhra_Pradesh))

proposed in Guntur District, Vijayawada, north of Guntur City, and will be developed under the Capital Region Development Authority. In accordance with the AP Reorganisation Act 2014, Hyderabad will remain the capital of both AP and Telangana states for a period of time not exceeding ten years.

The religious composition of AP is 92 percent Hindu, 6.9 percent Muslim, and 1.5 percent Christian. The official language of AP is Telugu. Other languages often spoken in the state include Tamil, Kannada and Oriya. The average literacy rate stands at 67.41 percent with 29,772,532 literates, significantly lower than the national average of 73.0 percent. West Godavari District has the highest literacy rate of 74.6 percent, and Vizianagaram District has the lowest with 58.9 percent. The overall population of the state includes 17.1 percent from Scheduled Castes and 5.3 percent from Scheduled Tribes.

Table: 5-5: Overview of AP state

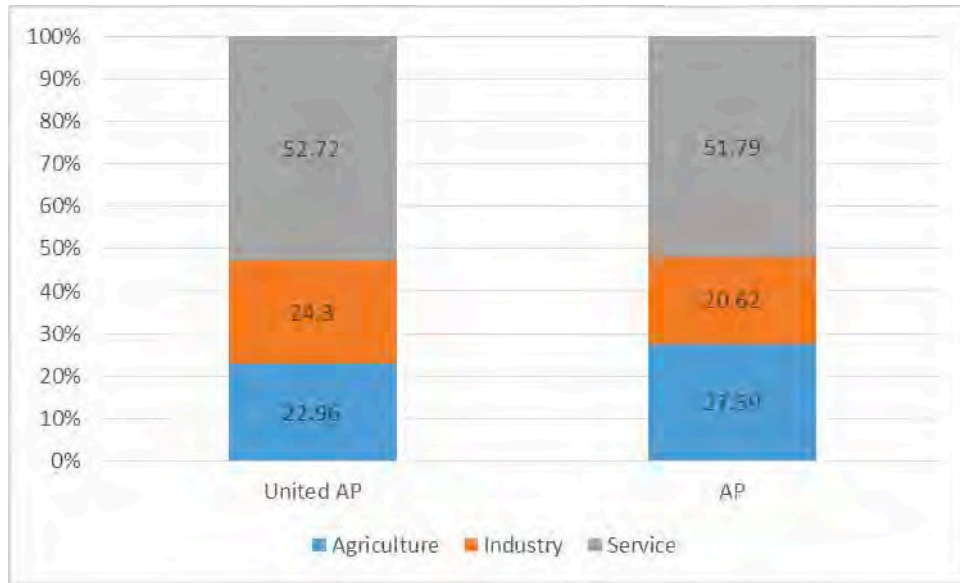
Governor	Sri E.S.L. Narasimhan
Chief minister	Sri Nara Chandrababu Naidu
Area	160,205 km <sup>2</sup>
Number of districts	13
Number of mandals	664
Population	49,386,799 (2011 census)
Rural population	34,776,389
Urban population	14,610,410
Literacy rate	67.41%
Poverty ratio	9.20%

Source: AP state portal, Socio Economic Survey 2013/24 and 2014/15

Poverty ratio of the state in 2011/12 is 9.20% dropping from 45% in 1993/94. It is considerably lower than Indian national average of 21.9%. Poverty ratio in rural area is 10.9% against 25.9% of national average, while that in urban area is 5.8% against 13.7% of national average.

## (2) Sector overview

According to the *Socio Economic Survey 2014/15*, the sectoral composition of the GSDP has undergone considerable change during the past few years, essentially shifting from the agriculture sector to the service sector. However, bifurcation of state impacted on this trend. The contribution of the agriculture sector in residual AP increased from that in united AP, while the contribution of both industry and service sector declined after bifurcation as shown in Figure 5-2. This shows that the importance of agriculture increased after bifurcation. In 2014/15 the share of agriculture in GSDP at current prices was 27.59 percent, industry 20.62 percent and service sector 51.79 percent.



Source: AP Socio Economic Survey 2014/15

Figure 5-2: Comparison of sectoral composition of GSDP at current prices (2014/15)

Industry comprises mining and quarrying, manufacturing, electricity, gas and water supply, and construction. Services include trade, hotels and restaurants, transport and storage, communications, banking and insurance, real estate and business services, and community, social and personal services.

### (3) Agriculture sector

Over recent decades AP has witnessed a gradual transformation of the agriculture sector. During the 1980s there was a shift in agriculture from the traditional cereal-based system towards commercial commodities such as oilseed, cotton and sugarcane. In the 1990s the transformation continued towards high-value commodities such as fruit, vegetables, milk, meat, poultry and fish. High-value commodities performed impressively, and to a great extent rescued the agriculture sector.

#### 1) Natural conditions

AP has arid, semi-arid and sub-humid climatic conditions. The average temperature varies from 15.7°C to 39°C. The average annual rainfall is 911 mm, two-thirds of which falls during the period of the south-west monsoon. The distribution of rainfall is erratic, resulting in frequent droughts. Coastal Andhra receives 80 percent of its rain during the south-west monsoon, while in Inland Andhra (Rayalaseema) most rain comes during the north-east monsoon.

About 50 percent of the area of the state falls under dryland agriculture, and the rest is irrigated. The total cultivated area is 8.6 million hectares, and this is spread over various agro-climatic regions.

The table below presents basic meteorological data of several districts.

Table 5-6: Meteorological data

Category/District	Chittoor	Krishna	Kurnool	Guntur	Prakasam
Major crop	Mango, tomato	Mango	Tomato	Chili	Chili
Maximum temperature (°C/May)	42	40	45	47	49
Minimum temperature (°C/December).	12	26	26	15	26
Annual rainfall (mm/year)	934	1028	670	830	871
Altitude (m)	183	97	10	33	0
Hours of sunshine	8	10	10	10	10

Source: Survey conducted by CHANGE

## 2) Land Holding

According to the *Socio Economic Survey 2013/14*, 4.282 million hectares were under food grains in AP in 2013/14. The average size of land holding in the state has declined marginally from 1.13 hectares in 2005/06 to 1.06 hectares in 2010/11. The number of holdings has increased from 7.216 million in 2005/06 to 7.621 million in 2010/11.

In 2010/11, 65.4 percent of the holdings were marginal (less than 1 hectare), and 20.88 percent were small holdings (1-2 hectares). Thus marginal and small holdings constituted 86.28 percent of total agricultural holdings in the state, making agriculture a subsistence source of livelihood for the majority of the population<sup>54</sup>.

## 3) Horticulture

Horticulture is a significant and upcoming sector in AP. Horticulture has proved to be the best option for diversification of agricultural land, because of assured returns to farmers.

The fact that horticulture has moved from rural areas to being a commercial activity that has encouraged private investment is one of the most significant developments in the last decade. The transition from a traditional outlook to a trade-oriented outlook has brought a perceptible change to the concept of horticulture development in the state.

<sup>54</sup> Data before 2014 is of unified AP before bifurcation. No separate data is available.

Before bifurcation, AP ranked first in production of citrus, spices, oil palm, tomato, chili and turmeric; second in the production of mango and cashew; third in production of loose flowers; and fourth in production of banana (NHB Database 2011).

Horticultural crops were grown on an area of 1.626 million hectares, and production was 25.515 million tonnes during 2013/14.

Table 5-7: Area and production of horticultural crops in AP in 2013/14

Crop	Area (000 ha)	Production (000 tonnes)	Productivity (tonnes/ha)
Fruit	577	9,842	17.06
Vegetables	409	7,429	18.16
Flowers	22	126	5.73
Plantation crops	279	6,943	24.89
Spices	339	1,175	3.47
Total	1,626	25,515	15.69

Source: AP Department of Horticulture

There are 190 Agricultural Market Committees, under which 190 market yards and 134 sub-market yards are notified in the state. On average 24,500 farmers sell over 10,500 tonnes of vegetables directly to consumers every week through Rythu Bazars (farmers' markets).

## 5.2.2 Government policy and supporting system

### (1) AP government rolling plan for 2015/16

The AP government developed "A rolling plan for 2015/16 – Achieving double digit inclusive growth" in 2015. The plan, though a requiring refinement, shows determination and a sense of urgency for the policymakers in the AP government to catch up and exceed other states in India as soon as possible. The ambitious plan targets for AP state to be one of the three high performing states in India by 2022/23, the best state in India by 2029/30 and a leading investment destination in the world by 2050/51. In order to achieve this target, the state is required to grow at a rate of more than 10%, moving from the current growth rate of 7%.

In order to achieve this target, the plan adopted a "mission based" approach organizing a "mission" which is a kind of task force involving multiple departments sharing the same objective. The mission is considered to speed up the implementation process and therefore expedite the growth. There are seven missions, namely the primary sector mission, industry sector mission, service sector mission, knowledge and skill development mission, social empowerment mission, urban infrastructure mission and infrastructure mission.

The primary sector consisting of agriculture, livestock and fishery is considered as an engine for growth. The sector is the biggest employer as 60% of its population work in the primary sector. With favorable climatic conditions and a strong production base, the primary sector in AP has a comparative advantage to other states in India. In addition, prospects for food processing, which the state has an agglomeration of in Chittoor, makes the primary sector more promising.

The plan introduced a robust monitoring and evaluation framework. The indicators for input and output level are set at the department level for regular monitoring and evaluation, while the indicators for outcome and output for each mission are set and reported by mission coordinators to the chief secretary and chief minister. The progress will be reviewed monthly by the chief secretary and quarterly by the chief minister. The plan is expected to be reviewed and updated in 2016/17, 2018/19, 2022/23 and 2029/30.

The state government has started monitoring the progress. The big meeting for the primary sector where all the officials in charge of the primary sector in the state attended was held in Vijayawada on 24 June 2015. The Study team was informed by multiple officials who attended the meeting that the meeting chaired by the chief minister lasted around 12 hours and discussed how to achieve the target. If the strong leadership and commitment of the state government continues and the plan is implemented, reviewed and improved constantly, there is a good potential for the state to achieve rapid growth.

## **(2) Government strategy in Horticulture**

The Government of AP has focused on increasing production and productivity of horticultural crops, development of infrastructure for post-harvest management, and providing access to domestic and export markets. The state government's strategies for horticulture sector development are shown below.<sup>55</sup>

- Increase in production and productivity of horticultural crops for sustainable growth, through rejuvenation of old orchards, organic farming, supply of improved and hybrid varieties, and encouraging tissue culture plants and intercropping.
- Encourage efficient and effective utilization of water through micro-irrigation.
- Improve quality through adoption of crop-specific IPM and INM.
- Adopt pre- and post-harvest management practices through modern technologies such as reefer vans, farm fresh vegetables and vending vans.
- Facilitate processing, value addition, marketing and export of horticultural produce by reviving AEZs in the state.
- Give emphasis to knowledge inputs such as training programs, field visits, distribution of literature, and use of IT for rapid dissemination of knowledge, in collaboration with the Horticulture University.

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<sup>55</sup> AP Department of Horticulture, *Outcome Budget VII (Agriculture) 2014-15*

- Encourage crop-specific clusters and work with the National Rural Employment Guarantee Act (NREGA) for better utilization of labor and resources.

The rolling plan 2015/16 sets the performance indicators for the horticulture sector as follows:

Table 5-8 Performance indicators for the Horticulture department

No	Indicator	Unit	Performance in 2014/15	Target for 2015/16
1	Area expansion with drip irrigation	ha	2,536	18,000
2	Area of Horticulture to be brought under Micro Irrigation	000ha	36	100
3	Quality control laboratory	No	0	5
4	Custom hiring centers	No	0	30
5	Certification of GAP	No	0	7,000
6	Pack houses established	No	218	750
7	Shade nets established	No	97	150
8	Cold storage established	No	8	10
9	Reefer vans	No	0	10
10	Green houses/poly houses	No	225	250
11	FPO (No. registered)	No	0	48
12	FPO(turnover)	INR	0	0

Source: AP rolling plan 2015/16

The indicators above are those for which the Horticulture department is responsible for achievement. There are also crop-wise performance indicators as shown below.

Table 5-9 Crop-wise performance indicators for the Horticulture department

Crop	Performance in 2013/14			Performance in 2014/15			Target for 2015/16		
	Area	Production	Gross Value Addition	Area	Production	Gross Value Addition	Area	Production	Gross Value Addition
	000ha	000tonnes	billion INR	000ha	000tonnes	billion INR	000ha	000tonnes	billion INR
Banana	61	1,888	37.17	61	2,871	39.66	N.A	3,267	47.79
Chilies	13.1	602	38.55	135	524	41.13	N.A	597	49.57
Mango	30.4	2,737	32.48	309	2,784	34.65	N.A	3,173	41.76

Source: AP rolling plan 2015/16

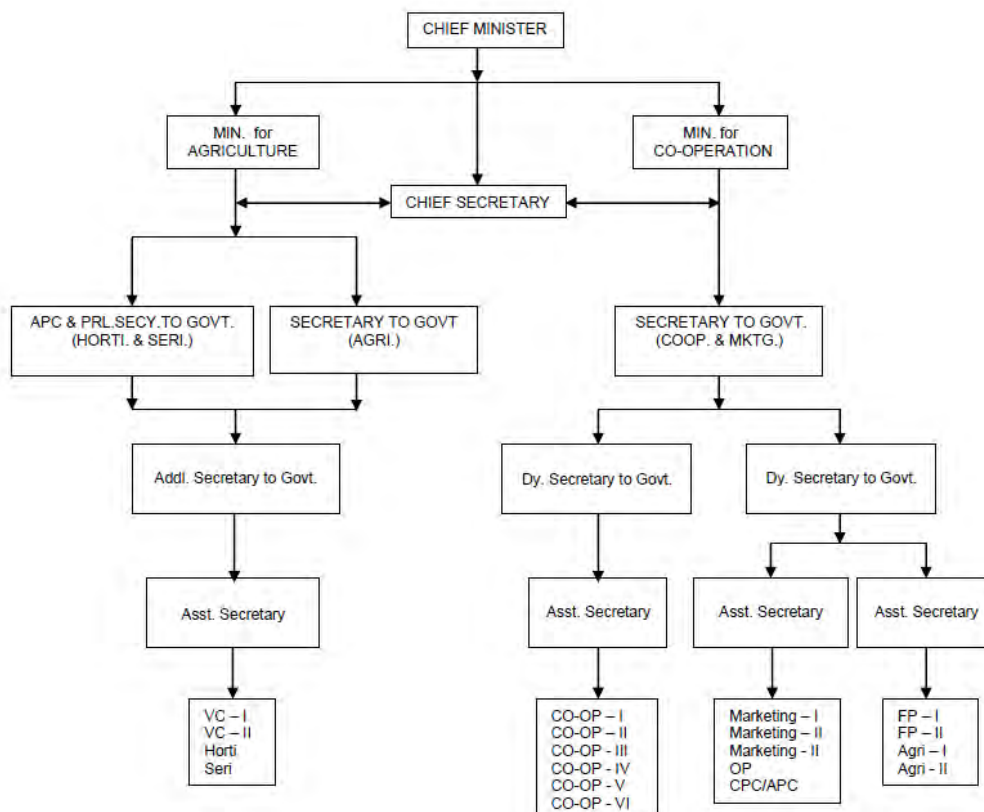
The progress of achieving these indicators will be reviewed regularly as explained in the previous section.

### (3) Organizational structure

#### 1) Agriculture and Horticulture

The agriculture sector in AP is administered by two ministers - the Minister for Agriculture and the Minister for Cooperation. The Department of Agriculture and Cooperation is responsible for formulating and implementing national policies and programs in the state to achieve rapid agricultural growth through optimum utilization of the state's land, water, soil and plant resources. The focus areas of the department are agriculture, marketing agricultural produce, horticulture and sericulture.

The Agriculture, Cooperation, Marketing, Horticulture and Sericulture Wings of this department deal with all service matters, court cases, and all financial matters including schemes of the state and central government, legislative matters and welfare measures. It should be noted that the agriculture department deals with all the food grains, maize, cotton and oil seeds while horticulture department deals with vegetables, fruits, flowers and spices.

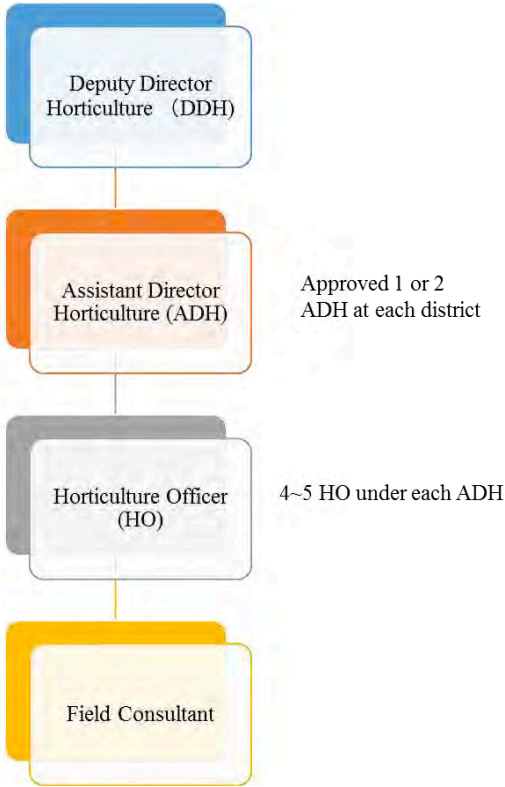


Source: AP online (<http://aponline.gov.in/APPortal/index.asp>)

Figure 5-3: Organizational structure of the Agriculture and Cooperation Department

All issues related to the horticulture sector are administered by the Department of Horticulture lead by the Horticulture Commissioner. Deputy Director Horticulture (DDH) is responsible for administering the

horticulture sector in the relevant district. One or two Assistant Directors Horticulture (ADHs) have been assigned to supervise specific areas, and seventy-two Horticulture Officers (HOs) have been appointed. It is planned to recruit ten more ADHs and eighty HOs by the end of June 2015. One HO typically takes charge of six to ten mandals, with an area of 25,000-30,000 acres. The role of the HO includes providing technical advice on cultivation of horticultural crops including flowers and spices, executing various schemes, conducting training and exposure trips for farmers, organizing meetings to advocate new technology, and evaluating the need for assistance after a natural disaster. A field consultant is assigned to each HO to support their daily tasks, but a shortage of manpower to fulfill the designated tasks is a big challenge at the field level.



Source: Study team

Figure 5-4: District Horticulture Department organization structure

At the district level, both the agriculture department and the horticulture department have their officers on the ground. As the crops each department deals with are clearly demarcated, there is no duplication of work at the field level.

## 2) Production and Marketing

The Horticulture department deals with production and post-harvest handling of horticulture crops, but does not deal with marketing. Marketing of agricultural produce is a task for the Department of Agricultural Marketing. However, its main task is supervision of the APMC markets which sell not only horticulture produce but also grains, livestock and fishery produce. Although the state government initiated APMC reform which promotes contract farming, there is no function at the existing department to assist sales of farmer's produce such as connecting farmers to buyers or providing market information to farmers. Consequently, most of the farmers have no choice but to sell their produce at the APMC market.

## 3) Production and Processing

For the food processing sector, the AP Food Processing Society (APFPS) was established by the state government under The AP Societies Act, to act as a nodal agency for development of the food processing sector in the state. The Society belongs to the Department of Industry. It covers any types of food processing using grain, vegetable, fruit, livestock, dairy and fishery. There is no section dealing with processing within the Department of Agriculture.

The role of each concerned organization of AVC in the state is shown in the table below.

Table 5-10: Role of concerned organizations

Ministry	Ministry of Agriculture			Ministry of Industry and Commerce
Department	Department of Agriculture and Cooperation			Department of Industry
	Department of Agriculture	Department of Horticulture	Department of Marketing	Food Processing Society
Role	Production support of food grains	Production support for horticulture crops	Management of the wholesale market (grains, horticulture, livestock, fisheries)	Promotion of the food processing industry (grains, horticulture, livestock, fisheries)

Source: Study team

The description above shows that there is an administrative gap between production and marketing, and production and processing. There is an increasing need for assistance in the area of marketing for farmers, as the marketing channel is diversified these days. The Study team found that there are many enthusiastic Horticulture officers on the ground who have good relations with farmers<sup>56</sup>. They have realized the acute needs of supporting farmers' marketing but are unable to do so due to the lack of knowledge and skills for marketing. However, there are some exceptions. For instance, one officer in Chittoor regularly

<sup>56</sup> For instance, the officers in Guntur and Chittoor.

communicates with farmers and processors. He sometimes connects them for direct sales. DDH in Chittoor was very aware of the needs of contract farming and, this officer has his own plan to promote it. These examples show that there is a good possibility that Horticulture officers can assist farmers in their marketing if they are provided appropriate training.

### (3) Schemes to support horticulture sector

The total budget for promoting the horticulture sector during 2014/15 was INR577.6 million. The major programs were the MIDH and State Plan Schemes. The budget figure for each scheme for 2014/15 is given below.

Table 5-11: Budget for horticulture schemes 2014/15 (million INR)

State Plan Schemes	
Promotion of Horticultural Activities	27.82
Central Plan Schemes	
MIDH	348

Source: AP Department of Horticulture

- MIDH

As explained in 2.2.1, MIDH is a centrally-sponsored scheme to promote holistic growth of the horticulture sector through area-based regionally-differentiated strategies. In AP, the scheme focuses on area expansion through developing nurseries, productivity improvement through rejuvenation, canopy management and farm mechanization. It also covers introduction of new technology such as IPM, protected cultivation and organic farming.

Table 5-12: State Plan Scheme 2014/15

Component	Physical target	Budget (million INR)
Promotion of horticultural activities		
1) Area expansion of horticultural crops	1,85.75 ha	27.82
2) Poly sheets	5,633	
3) Plastic crates	34,286	
Centrally-sponsored schemes		
1) Nurseries	8	348
2) Establishment of new gardens	1,680 ha	
3) Maintenance of area expansion (second and third year)	4,500 ha	
4) Rejuvenation/canopy management/top working	2,600 ha	

Component	Physical target	Budget (million INR)	
5) Protected cultivation	12.64ha		
6) Mulching	1,000 ha		
7) IPM/INM	3,050 ha		
8) Organic farming	600		
9) Farm ponds	30		
10) Training	5,470 farmers		
11) Post-harvest management	69		
12) Farm machinery	2,324		
13) Awareness program	5		
Staff scheme			
Provide extension needs at the village/mandal level	NA		201.78
	Total		577.6

Source: AP Department of Horticulture

#### (4) Progress of market reform

AP is one of the leading states that amended their existing APMC legislation and allow private companies to procure directly from the farmers. It is ahead of other states in terms of the number of high value retailers who procure directly from the farmers. In Hyderabad (currently the shared capital with Telangana), there are dozens of retail players dealing with fresh fruits, vegetables, dairy, frozen foods and other processed foods. After bifurcation, the reform of legislation continues in new AP and retail outlets are extended in the region. Despite the advanced status of legislation of amendments, the speed of actual implementation is still slow like that in all other states.

Table 5-13: States of the APMC Act amendment in AP

Topic	Status
Establishment of a private market yard and direct purchase from farmers	Adopted the suggested provision
Establishment of a consumer/farmers market	Amended the Act but did not adopt the provision
The contract farming sponsor shall get the contract farming agreement recorded with the prescribed officer	Adopted the suggested provision
No title, rights, ownership or possession of land shall be transferred, alienated or vested in the contract farming sponsor or his successor or his agent as a consequence arising out of the contract farming agreement	Amended the Act but did not adopt the provision

Topic	Status
Dispute settlement mechanism in contract farming	Adopted the suggested provision
Specification of model agreement for contract farming	Amended the Act but did not adopt the provision
Single registration for trades/transactions in more than one market	Amended the Act but did not adopt the provision
Market fees shall not be levied for the second time in any market area of the state by a market committee	Amended the Act but did not adopt the provision
Setting up of a separate market extension cell in the board	Amended the Act but did not adopt the provision
Establishment of a state agricultural produce marketing standard bureau	

Source: AP marketing department

In order to rectify the non transparent trading practice where CAs charge farmers with higher commission than the official rate of four percent for perishables, the state government has introduced an electric bidding system in several markets which displays selling prices and thus prevent CAs from cheating farmers. It is planned to expand installation of this system in 10 markets in 2015. If this attempt becomes successful, the government plans to apply an on-line system for all market transactions, thereby accelerating the participation of all stakeholders to marketing in an indiscriminative manner.

Another attempt the AP government has promoted is setting up a farmers' market ("Rythu market" in local parlance). The concept was introduced in 1999, and there are 107 Rythu markets in AP<sup>57</sup>, 33 of which have a permanent structure. The main aim of the market is to ensure remunerative prices to farmers and to provide fresh products to consumers at a reasonable price by removing intermediaries. In practice, however, traders and CAs are selling produce instead of farmers. Based on the observation in the field survey, more than half of the vendors in the market are not real farmers.



Farmers market in Hyderabad

Crop wise reference price is displayed on the board

Photos: Study Team

<sup>57</sup> The data is for the former AP state, including Telangana. There is no separate data for new AP only.

## **(5) AVC infrastructure**

AP is situated in a strategic location with 972 km of coast line linking with two major national ports, Kolkata and Chennai. Chittoor, the hub for agriculture processing is also located between two of the largest cities – Bangalore and Chennai. The state has a road network over 146,954 km with 42,511km of state highways, 3,144 km of national highways and 101,484 km of district roads. National highway 5 acts as the spine of AP with over 1,000 km running through the state. It has four major container ports (Vishakhapatnam, Kakinada, Krishnapatnam, and Gangavaram) and six public airports (Cuddapah, Rajahmundry, Tirupati, Vijayawada, Vishakhapatnam), but none of these are international except for Vishakhapatnam. There is a plan to expand the Vijayawada airport as an international airport in accordance with developing a new capital in Guntur district.

- **Post harvest handling facilities**

Exporting horticulture products requires quality traits, adherence to sanitary and phytosanitary standards (SPS) and the availability of infrastructure for post-harvest handling. The government provides subsidies to set up a post-harvest infrastructure as explained above. The number of multipurpose cold storage units is concentrated in Guntur and Prakasam, as they are used mainly for dry chili storage, which is the prominent crop in the region. Processing units are almost non-existent in the state, except in Chittoor which is a production hub for mangoes and tomatoes.

Table5-14: District wise post-harvest infrastructure in AP

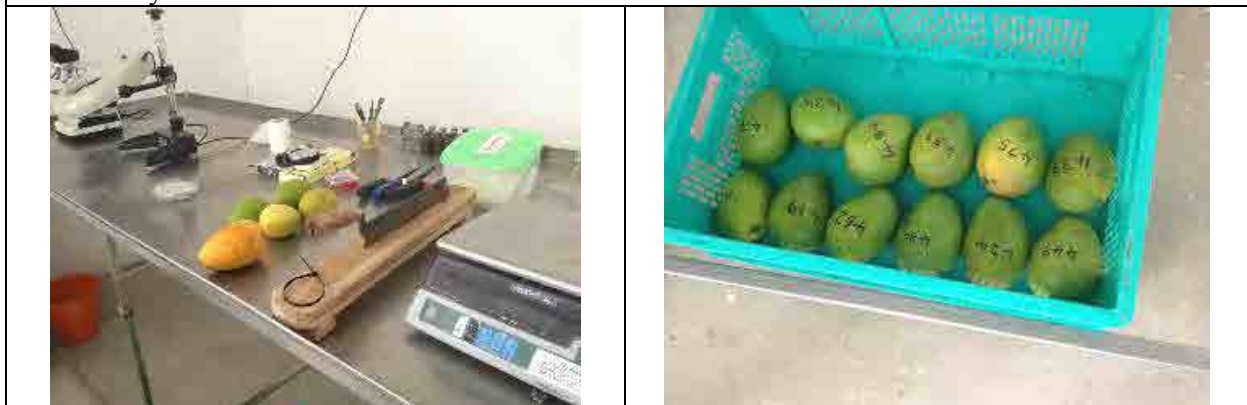
District	Cold storage (Multipurpose)		Ripening Chamber		Fruits processing unit	
	Number	Capacity (tonnes)	Number	Capacity (tonnes)	Number	Capacity (tonnes)
Srikakulam	0	0	0	0	0	0
Vijayanagaram	5	32,500	0	0	1	125
Visag	1	6,500	3	78	0	0
East Godavari	4	26,000	0	0	0	0
West Godavari	2	13,000	0	0	0	0
Krishna	26	169,000	5	130	3	375
Guntur	77	500,500	11	286	0	0
Prakasham	53	344,500	3	78	0	0
Nellore	5	32,500	1	26	0	0
Chittor	4	26,000	3	78	43	5,375
Kadapa	2	13,000	14	364	1	125
Ananthapur	8	52,000	14	364	0	0
Kurnool	14	91,000	25	650	0	0
Total	201	1,306,500	79	2,054	48	6,000

Source: Department of Horticulture

The constraint for the export of horticulture products is the stringent SPS requirement imposed by importing countries, especially the EU and Japan. Pesticide residue and microbial contamination limits are important for the trade of fruits and vegetables. For example, complying with each importing country's standards and requirements is essential for exporting mangoes. The US requires irradiation treatment, while EU requires hot-water treatment. Japan only allows imports of Indian mangoes provided they are treated by a vapor heat treatment (VHT) facility, which can eliminate a certain type of fruit fly which is strictly monitored in Japan. There are only four VHT facilities in India, two of which are in AP (Tirupati and Nuzbid). These facilities were established by the state government in 2008, but they had been idle as there was no export order. Therefore the management was handed over to a private company (Srini Food) last year. They resumed operation this year and the first batch is planned to be exported on a trial basis in July. To ensure the SPS of Japan is cleared, it is required that inspectors dispatched by the Japanese plant quarantine authority stay at the VHT facility throughout the season and check all the processes. Two inspectors are dispatched this year to resume export and conducting inspections in cooperation with the Indian quarantine authority. The cost of inviting inspectors from Japan should be covered by Indian exporters, and 85 percent of the cost is subsidized by APEDA.



VHT facility



Quarantine tests are conducted at a VHT facility to check if heat reached to the core of fruits by measuring the size.

*Photos: Study Team*

To conduct plant quarantine for export, exporter should submit an application to the regional plant quarantine station at the designated port through which the exporter intends to export. The exporter should present the consignment either at the regional plant quarantine station or at the exporters' premises for inspection. There are four quarantine stations in AP but the quarantine officers are dispatched from other state when capacity is required for specific commodities. In case of VHT facility in Tirupati which the Study team observed, one quarantine officer dispatched from Chennai plant quarantine office was conducting inspection in support of the Japanese inspector. According to the Japanese inspector's observation, skills and knowledge for quarantine inspection of mango should further be enhanced for stable export to Japan.

### ● Testing Laboratories

Currently, there are no NABL accredited laboratories in AP. The food processing industry is using the 5 laboratories located in Hyderabad, which now belong to Telangana. Recognizing the urgent needs for the full-fledged testing labs in the state, the state government announced the incentives to set up the laboratories in the AP food processing policy from 2015-20.

## (6) Other programs

### ● FPO

As indicated in 2.3.1, the Indian government has been making efforts to promote FPO, and AP is one of the top states of this initiative in terms of the number of organizations supported so far. Among all of the 302 FPOs established nationwide, 49 FPOs are in AP. Most of the organizations are groups for traditional crops such as cotton, pulses and paddies, and there are no officially registered and operational FPOs for horticulture crops as of today. Emergence of the actual activities of FPO is quite slow in the state. One section in the Horticulture Department is taking charge of the management of state level SFAC activity. HO is currently trying to mobilize interested farmers to form FPO and 48 groups of tomato farmers are now waiting for official registration.

### ● AEZ

The state government has promoted AEZs to boost the export of horticulture products. Currently, there are three AEZs (former AP state had five AEZs) as shown in the table below. The estimated cost of developing the AEZs are borne by the governments and private agencies as per the MOUs signed by the parties. For example, the estimated total project outlay was INR 572 million for the Hyderabad AEZ (currently in Telangana) for grapes and mangoes, of which the government share was INR 154 million and the private entrepreneurs' share was INR 418 million.

Table 5-15: AEZ in AP and Telangana

Name of AEZ	District	Products	Total estimated cost (INR million)
AP			
AEZ Vijaywada	Krishna	Mango	180
AEZ Chittir	Chittor	Mango pulp, Vegetable	110
AEZ Chili	Guntur	Chili	-
Telangana			
AEZ Hyderabad	RangaReddy, Mabubnagar, Medak,	Grapes, Mango	570
AEZ Gherkin	RangaReddy, Mabubnagar, Medak, Karimnagar, Warangal, Anantapur	Gherkin	200

Source: AP Department of Horticulture

The Chittoor AEZ is the most successful in the state as well as in the country. The annual turnover of pulp exports from Chittoor increased from INR 750 million before the establishment of AEZ to INR 3,300

million in 2012<sup>58</sup>. Besides the modernization of several units and support for HACCP certification acquisition, the government has exempted sales tax on all inputs and packaging material uses for exports. There are a number of other demands from the processors, but on the whole the industry is responding well to the policy support.

### **5.2.3 Mango (for table purpose)**

#### **(1) Overview of crop production**

According to the NHB, the total volume of mango produced in 2013/14 was 2,737,010 tonnes, the second largest in India after Uttar Pradesh (UP). About 20 percent are table varieties (such as Benishan and Neelam). The average productivity of mango in the state is 9.0 tonnes per hectare; this is higher than the national average of 7.2 tonnes per hectare, but much lower than 16 tonnes per hectare in UP.

As indicated in 2.1.2, usage of calcium carbide for artificially ripening of fruits is banned as it is harmful for human health. Both high-end domestic and overseas markets require fruits ripened either by natural way or ethylene gas. But due to lack of proper ripening facility and cost factor, ripening by calcium carbide is still widely used for the fruits for general domestic market.

#### **(2) Current status and bottlenecks in the value chain<sup>59</sup>**

##### **1) Overview of VC**

Figure 5-5 depicts an overview of the mango value chain in AP. Agricultural laborers are hired by farmers to provide labor for work such as harvesting. Agricultural laborers are generally landless or marginal farmers. Some mangoes farmers in AP sell to pre-harvesting contractors, who are basically mango traders. They come to villages in November and December when mango flowers, check the condition of mango trees and conclude contracts with farmers to buy mango from entire orchards. After they conclude the contract, they are responsible for farm management, harvesting and sale of the mango. They hire laborers to do the work on the farms. Contractors generally sell mango to the APMC markets.

Farmers who do not sell to pre-harvesting contractors generally take table varieties of mango to APMC markets. For the farmers who live far from markets, collectors (who include intermediaries, traders, middlemen, and transport agent) are generally involved in the transportation of mango from farmers to markets. There are small number of progressive farmers who sell their good quality mangoes to exporters and who take their mango to ripening chambers to improve the quality and look of their mangoes.

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<sup>58</sup> 'A Study on exports channels of mango products: The role of agri export zone (AEZ) in Chittoor district' Tripuraneni Jaggaiah et al. International Journal of Sales and Marketing (2014)

<sup>59</sup> The figures and information of this section is based on the field survey by the Study Team.

At the APMC markets, Commission agents are responsible for managing the auction at APMC markets, and mango is sold to registered traders who transport the mango all over the country. They often do casual grading before shipping. Traders deliver most of the fresh mango to large-scale wholesalers all over the country. Wholesalers often engage in grading and packing.

Fresh mango is then delivered to various types of retailers (organized and unorganized retailers, and small high-end grocery shops). It is usually difficult for organized retailers to form their own supply chain for mango, so most of them obtain it through the traditional supply chain.

Exporters make hot water or vapor heat treatment for insect control. The treated mangoes are exported by air. Despite huge volume of mango trade transaction, there are few exporters in the state as most of them are stationed in Hyderabad.

Mango production



← ..... *Agricultural laborers are hired for farm management and harvesting*

← ..... *Department of Horticulture*  
Horticulture officer gives extension service and various subsidies to farmers

*Farmers grow mango for both table and processing*

*Farmers or traders deliver table varieties of mango to APMC market*

Auction



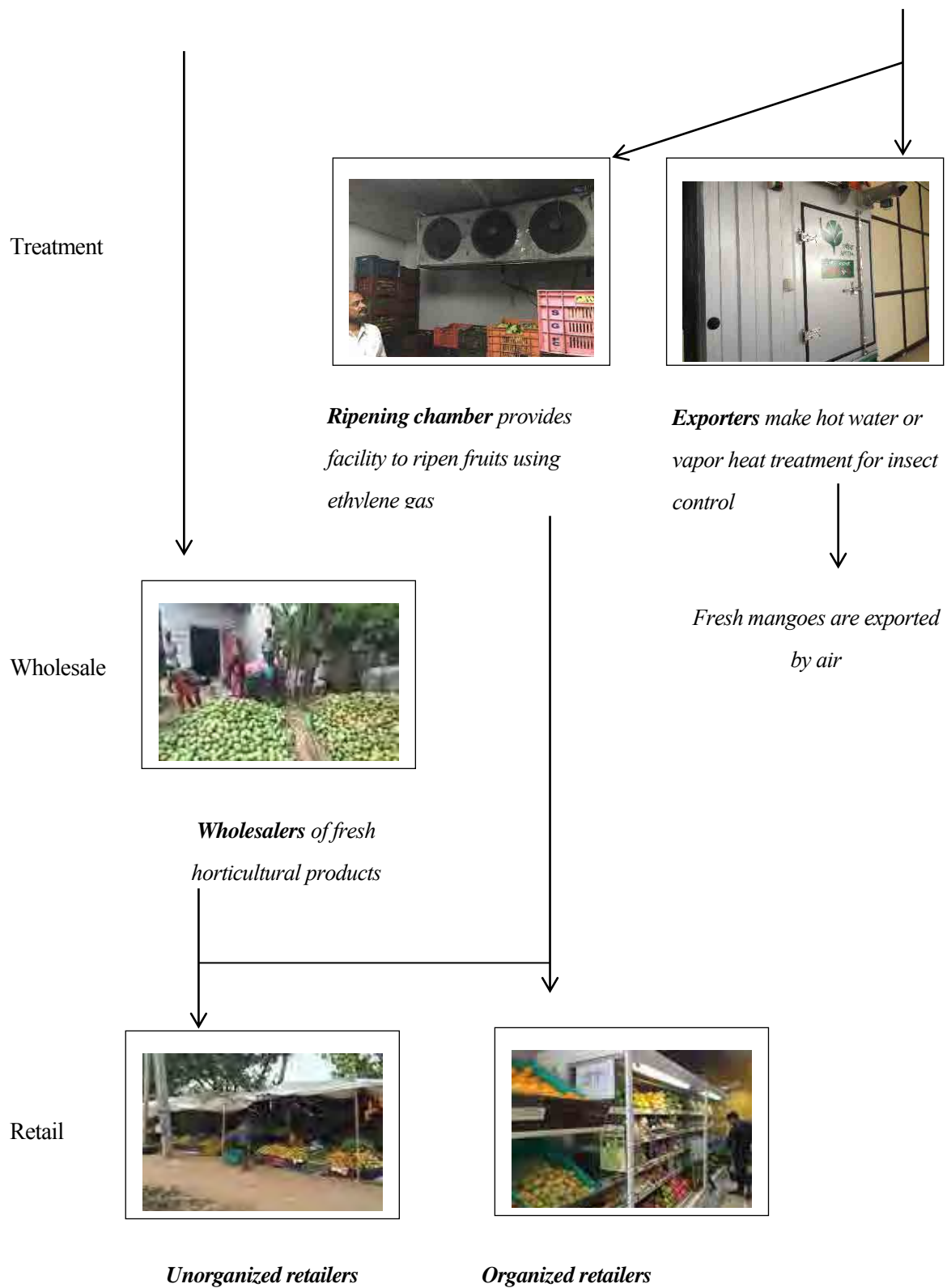
**APMC**  
*manages wholesale markets*

*Auctions are managed by **commission agents**, and mangoes are sold to registered **traders** who come from all over the country*

Delivery

*Traders deliver table mangoes to wholesalers all over the country.*

*Many traders ripen mangoes using calcium carbide, which is illegal.*



Source and photos: Study team

Figure 5-5: Mango value chain in AP

The price of mango (for table purpose) changes through the value chain in the following ways.

Table 5-16: Selling price of mango for table purpose

Sales point	Prices
Selling price at wholesale market	Average price realization by farmer is INR14/kg.
Selling price to commission agent/village trader (commission agent only facilitates the auction process and gets commission)	Commission of 4% is allowed. Yet commission agents deduct 8-10 % out of farmers' payment.
Selling price to pre-harvesting contractor	INR8-10/kg.
Selling price to retailer	Average price is INR34/kg.
Selling price to consumer	Average price is INR55/kg.
Selling price of fresh mango to exporter (farm gate)	INR25-50/Kg.

Source: Study team

## 2) Stakeholder assessment

### a) Agricultural laborers

#### i) Role

Agricultural laborers provide labor to mango farmers (landowners) for work such as harvesting.

#### ii) Performance:

Payment is INR150-200 per day. Lunch and tea are provided by farmers/landowners.

#### iii) Resource (factors of production)

Skills: Their handling of mango is generally poor. As their payment is fixed regardless of the quality of their work, there is no incentive to improve their skills.

### b) Farmers (landowners)

#### i) Role

The role of farmers (landowners) is to farm mango, including farm management and harvesting with the help of agricultural laborers.

#### ii) Performance:

The yield of mango varies between 5 tonnes and 20 tonnes per acre, due to alternate bearing and the difference in water availability. The average selling price for table varieties last year was INR15-20 per kg, and the cost of production is about INR15,000- 20,000 per acre.

Mango farming, which requires a small amount of labor, seems to be rewarding even for small farmers.

#### iii) External environment

There is little precipitation in this area, which means farmers have to invest in irrigation facilities.

#### iv) Resource (factors of production)

Land: The majority of farmers are small farmers, but there are also a number of medium- and large-scale mango farmers.

Water: Supply of water is a major problem, as there is little rainfall and groundwater. The cost of boring is about INR100, 000, which is a heavy burden. Each farmer has his own well, as the amount of water in each well is too small to share.

Labor input: Mango farming does not require a lot of labor. Generally, labor is needed for:

- Plowing : 3 times a year
- Spraying pesticide : 2-3 times a year
- Fertilizer: 2-3 times a year
- Pruning in the spring
- Harvesting is done by agricultural laborers. About ten laborers per acre are needed to harvest mango.

Other inputs: Many farmers do not use crates when transporting, but put mango directly into the trucks or tractors.

Skills and technology of farming: Most of the farmers exercise cultivating based on their experience, even though Horticulture Department gives regular training on cultivation to the farmers. Many farmers face problems in pest and disease, and thus the demand for pest and disease control technology is high. There are a small number of progressive farmers who have GAP certificates and are skillful in producing good quality mangoes.

Skills for harvesting: Mango trees are 2-3 m high, and many fruit is collected by shaking the trees; this is likely to damage the fruit. Some farmers use net to harvest fruits.

#### v) Linkages

Farmers who live close to markets generally take mango directly to APMC markets without involving collectors. Farmers grade the mango into three grades. The price difference between the top and bottom grade is INR1-5 per kg. Those farmers who live far from the markets typically sell their mangoes to local traders. The selling price for this case is 20-30percent less than the case for direct sales to processors.

Many small and marginal farmers are depended on traders for advanced payment or loan for them to pay for the inputs for cultivation. The commission rate from farmers to traders becomes 10 percent if the farmers get advanced payment or loan from traders whereas the commission rate without advanced payment or loan is 5 percent.

About 15-20 percent of farmers (depending on the areas) agree pre-harvesting contracts to save time and energy for farming.

There are a few several farmers' organizations for mango. There is, however, no organization which is considered to be successful, and the performances of these organizations are generally poor. The promotion of FPOs by the SFAC, which has just started, is another attempt to promote the aggregation of farmers.

vi) Relevant government institutions

Department of Horticulture: There are only ten HOs and ten Field Consultants (who support HOs) in Chittoor, which is not enough to cover the whole region. It is planned to recruit eight more Officers by March 2015.

HOs play the role of extension officer, giving farmers guidance on such activities as pest control and new cultivation methods. They sometimes organize exposure tours to observe progressive cultivation techniques in other regions.

There are various subsidies from the government:

- Provision of fertilizer and chemicals to expand the area farmed
- Replacing old trees by replanting new trees
- Tree management.

Some people claim the number of beneficiaries of these supports is limited, but only those who are aware of the existence of government support (about 20percent of all farmers) get these supports.

### **c) Commission Agents (CAs)**

i) Role

The role of a CA is as intermediary between farmers (sellers) and traders (buyers) at wholesale markets.

ii) Performance

CAs get 4 percent margin on sales value. Some farmers claim that the CAs often cheat farmers by imposing higher margin. Yet APMC states that such cheating does not exist. If such evidence is detected, the license of that CA will be cancelled.

iii) Relevant government institution

APMC manages the registration of CAs and traders who can participate in the trade at the market, and setting up management rules, commission rates and registration rates based on the APMC Act. They are also responsible for managing the infrastructure of the wholesale markets.

### **d) Traders**

i) Role

Traders buy agricultural products at auction and transport them all over the country. They also do casual grading before shipping the products.

ii) Performance

The commission rate for traders is generally 5 percent. They often make advanced payment or provide loans to farmers; the commission rate in this case is generally 10 percent.

iii) Relevant government institution

APMC manages the wholesale markets. Their responsibilities include registration of CAs and traders who can participate in the trade at the market, and setting up management rules, commission rates and registration rates based on the APMC Act. They are also responsible for managing the infrastructure of the wholesale markets.

### **e) Ripening chambers**

#### **i) Role**

Ripening chambers provide the facility to ripen fruits using ethylene gas, which improves the quality and look of the fruit. There are seventy nine ripening chambers in Vijayawada.

#### **ii) Resources (factors of production)**

Facilities: Each ripening chambers firms owns 1-4 chambers where the capacity of each chamber is about 20-15 tonnes.

#### **iii) Linkages**

The number of farmers who ripen their mangoes using the ripening chambers are increasing slowly. However, only small portion of farmers are aware that the price of naturally ripened mangoes (by ethylene) is 20-30 percent higher than those that are ripened by calcium carbide.

#### **iv) Relevant government institutions**

Department of Horticulture: Amruth Banana Ripening Industry received INR0.5 million subsidy from the Department of Horticulture for investing INR6 million to build the ripening chambers.

### **f) Exporters**

#### **i) Role**

Exporters sell high quality mangoes to the importers of foreign countries. They treat mangoes by vapor heat or hot water to control insect before exporting mangoes (vapor treatment is required only for exporting mangoes to Japan).

#### **ii) Resources (factors of production)**

Facilities: There are two VHT facilities in AP, Nuzbit and Tirupati. The VHT in Tirupati is not currently used. That in Tirupati has been leased to Srini from this year, and Srini has started exporting fresh mangoes to various countries using this facility (the estimated quantity of export by Srini is about 30 ton). There are also packing facility and cold storage in the VHT facilities.

This year, Japanese quarantine inspector has visited VHT in Tirupati for the first time in the last several years. The inspection took longer time than expected, as the knowledge on insect control procedure has not been accumulated among the processors and Indian inspectors.

Other small exporters generally use hot water treatment facilities for insect control. There are not enough cold storages which can be readily used for exporting mangoes near the airports of Hyderabad, Vijayawada, and Vishakhapatnam, whereas they are available near Chennai airport.

### iii) Linkages

Backward linkages: Srinivasa food ltd. has thirty six registered mango farmers who are capable of producing export quality mangoes.

### iv) Relevant government institutions

APEDA: APEDA Hyderabad office is in charge of AP and Telangana. There are four staffs who work for that office.

APEDA provides various supports and subsidies in exporting activities which include the followings.

- Provided funds for establishing two VHT facilities in AP (which were built in 2007). The amount of fund provided was INR100 million per facility.
- Provide subsidies of INR7.5 million for the establishment of pack house. Five pack houses with cold storage have been accepted for subsidy.
- Provide 10 percent subsidy for export.
- Bear 90 percent of total costs of inviting Japanese quarantine officer to inspect VHT facility.

## **g) Wholesalers**

### i) Role

Wholesalers are intermediaries who deliver on a large scale. They often engage in grading and packing. They also provide finance to small traders.

### ii) Performance

The profit margin of wholesalers is estimated to be 10 percent.

### iii) Resource (factors of production)

Large wholesalers often have large cash resources at hand, so they provide finance to small traders.

## **h) Unorganized retailers**

### i) Role

Unorganized retailers are responsible for retailing products. Unorganized retailers include Kirana stores, fruit and vegetable or product-specific outlets and vendors, and stalls on the streets, which are all small-scale.

### ii) Performance

The profit margin of unorganized retailers is estimated to be 20 percent.

### iii) Resource (factors of production)

For small retailers, access to credit is limited. They are typically dependent on private moneylenders for daily transactions, and have to pay high interest rates.

### **i) Organized retailers**

#### **i) Role**

Organized retailers are responsible for retailing products. Organized retailers include supermarkets, convenience stores, hypermarkets, and cash and carry shops.

#### **ii) Linkages**

It is usually difficult for organized retailers to form their own supply chain of agricultural products, as contract farming is not popular in India. Most organized retailers rely on fragmented traditional supply chains to obtain fresh mango.

### **j) Small high-end food shops**

#### **i) Role**

Small high-end food shops are small grocery retailers in the big cities that sell high-end agricultural products, including fresh vegetables and fruits, to middle- or high- income households. The high-end market for fresh fruit in India is small, but likely to grow.

## **3) Value Chain Assessment**

### **a) Evaluation of the Value Chain**

Table 5-17 below shows the result of SWOT analysis for the fresh mango industries in AP. It indicates that there are various strengths in fresh mango industries such as large quantity of production, the existence of progressive farmers and supporting facilities, and good access to the markets.

However, as one can see in the weakness part of the SWOT table, linkages among the main players in the value chain are weak, and these factors hinder the full utilization of the strengths.

The increasing demands for high value fresh mango in the domestic and international markets provide opportunity for the fresh mango industries in AP to develop further, however, the competitions with other mango producing areas is also becoming severe. Also, the mango industries in AP have to accommodate with the rise of awareness for food safety.

Table 5-17: SWOT analysis for fresh mango industries in AP

Strength	Weakness
<ul style="list-style-type: none"><li>● Large production volume</li><li>● Existence of progressive farmers who produce good quality of mangoes</li><li>● Existence of supporting facilities such as pack house, VHT, and ripening chamber</li><li>● Existence of fresh mango exporters</li><li>● Conducive investment climate</li><li>● Good road connections to major cities</li></ul>	<ul style="list-style-type: none"><li>● Water shortage, pest and disease</li><li>● Improper harvest and post-harvest handling</li><li>● Weak incentive to improve quality</li><li>● Weak linkage between farmers and processors</li><li>● Weak linkage between farmers and high value market</li><li>● Low brand image of Indian mango in the</li></ul>

● Availability of airport for export	international market
Opportunity	Threat
<ul style="list-style-type: none"> <li>● Demand for high value fresh mango in domestic market is increasing although it is small</li> <li>● Demand for good quality fresh mango is increasing in the international markets.</li> </ul>	<ul style="list-style-type: none"> <li>● Increasing competitions with other countries such as Kenya, Thailand, Philippines</li> <li>● Competition with other states in India</li> <li>● Increasing awareness for food safety such as chemical residue and insects in the international markets.</li> <li>● Increasing labor costs</li> </ul>

Source: Study team

### b) Potential for upgrading

As the demands for high quality mangoes in both domestic and international markets are expected to increase, there seem to be significant opportunities for mango producers to increase their value-added by targeting to high-end markets. Currently, the linkage between farmers and these markets are weak. It is necessary to develop a mechanism that market information is effectively flow to the producers. It is also important to establish the necessary facilities such as ripening chamber, treatment facilities, and cold storage or promote utilization of existing facilities.

### c) Bottlenecks

Bottlenecks and constraints for upgrading the value chain would include the following.

#### Production and post-harvest management

- Water scarcity
- Pest and disease
- Most of the mango farmers are small scale
- Difficulty to form farmers' group
- Little opportunity for farmers to get training in cultivation, harvest and post-harvest management
- Improper post-harvest handling
- Lack of necessary materials for post-harvest management such as crates

#### Distribution and marketing

- Poor marketing capabilities of farmers
- Weak linkages between farmers and high-end markets
- Ripening by calcium carbide is extensively exercised by traders even though it is illegal

- Knowledge on proper insect control procedure for export has not been accumulated among Indian inspectors and processors
- Lack of necessary facilities such as cold storage for export
- Low brand images of Indian fruits in the international markets

More detailed problem analysis on mango is given in ANNEX 7.

#### **4) Need for assistance**

The assistance needed for the upgrade includes the following measures.

- Mango production
  - Provide training on farm management, including water management
  - Provide training on post-harvest management
  - Introduce standards and certificates
- Supporting industries
  - Promote local packaging makers.

## **5.2.4 Mango (for processing purpose)**

### **(1) Overview of crop production**

In the total volume of mango production of 2,737,010 tonnes<sup>60</sup> in 2013/14 in AP, about 80 percent of is processing varieties (mainly Totapuri, and a small volume of Alphonso)<sup>61</sup>.

### **(2) Current status and bottlenecks in the value chain<sup>62</sup>**

#### **1) Overview of VC**

Figure 5-6 below depicts the value chains of mango for processing purpose. Mango farmers conduct cultivation and harvesting with the help of agricultural laborers. Many farmers take processing varieties of mango to either processors or the APMC markets. For the farmers who live far from markets or processing firms, collectors (who include intermediaries, traders, middlemen, and transport agent) are generally involved in the transportation of mango from farmers to markets or processors.

Agricultural laborers are hired by farmers to provide labor for work such as harvesting. Agricultural laborers are landless or those who cannot farm due to lack of water. Also, many of the marginal farmers who owns 2-3 acres of land or less are engaged in agricultural labor including mango cultivation.

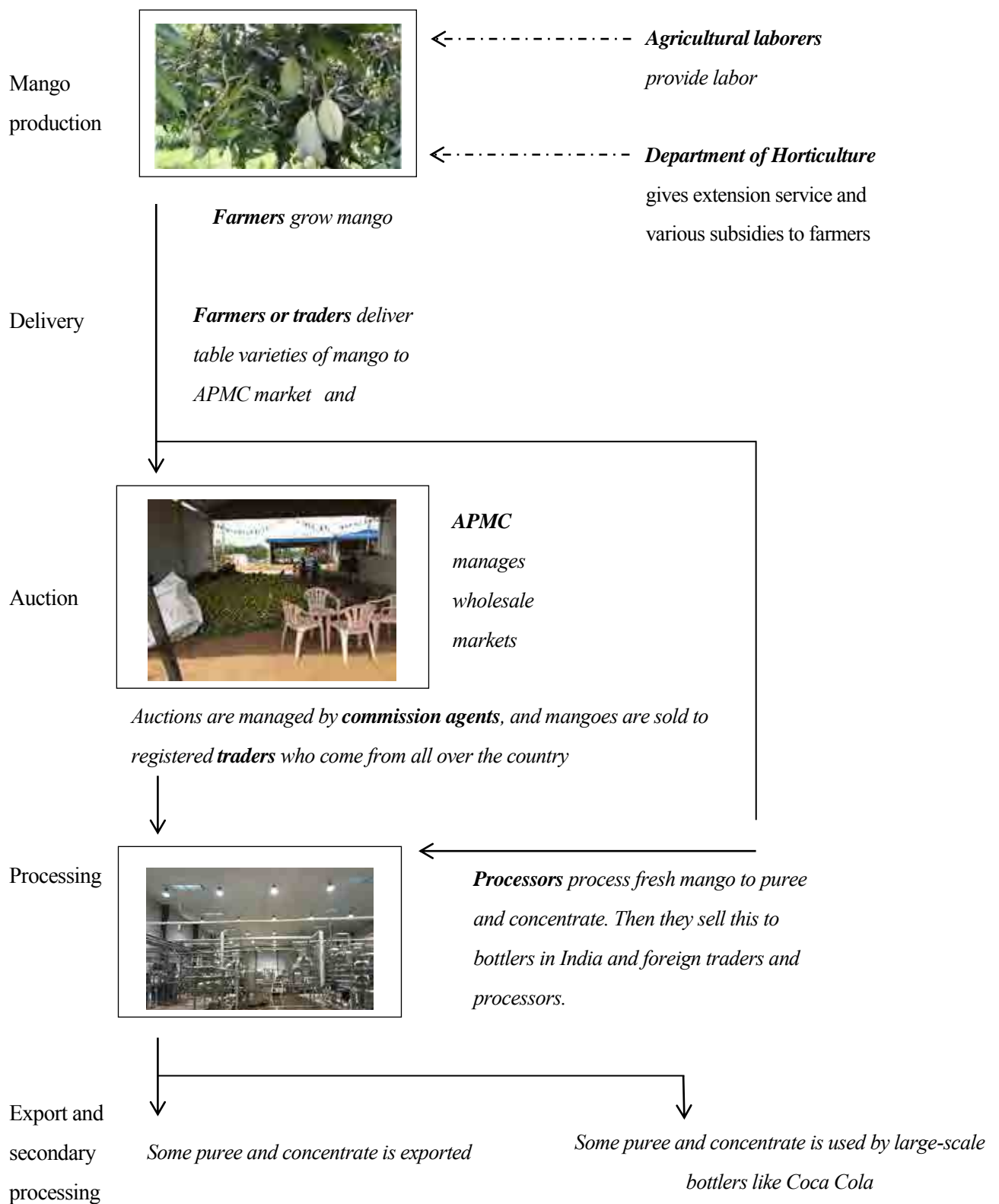
There are five APMC markets which deal with the mango trade in Chittoor. The biggest mango market is in Tirupati, and the second largest is in Bangarupalyam. Both table and processing varieties are traded in the markets. In the case of Bangarupalyam market, 70 percent of total mangoes traded are processing varieties, and 30 percent are table varieties.

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<sup>60</sup> Horticulture Board - Area and Production Estimates for Horticulture Crops for 2013-14

<sup>61</sup> Based on the interview with HO in AP.

<sup>62</sup> The data and information in this section is based on the field survey of the Study Team.



Source and photos: Study team

Figure 5-6: Value Chains for processing mangoes in AP

Commission agents (CAs) are responsible for managing the auction at APMC markets, and the mango are sold to registered traders who transport them all over the country. They often do casual grading before shipping.

There are sixty-four horticultural processing firms registered in AP, yet probably only twenty-five of them are still working. As big aseptic plants that produce mango purees and concentrate have been set up (such as Jain, Capricorn and Srini Foods), many traditional canned processing firms have gone out of business. These processors procure mango from traders or mango farmers. The main customers of these aseptic firms are large bottlers like Coca Cola (which sell their products in the domestic and international markets) and large foreign traders and processors. Some aseptic firms in AP started to produce tertiary processing products such as juice, jam and pickle.

The price of mango (for processing purpose) changes through the value chain in the following ways.

Table 5-18: Selling price of mango

Sales point	Price
Selling price at wholesale market	Average price of Totapuri (processing variety) is INR10/kg. The farmer receives INR9/kg.
Selling price to commission agent/village trader (CA only facilitates the auction process and gets commission)	Commission as per APMC rules is 4%. But in reality CAs deduct anything between 5-10% from payment to farmers to cover commission, wastage and handling. There is also a market fee of 1% to be paid to the APMC.
Selling price to pre-harvesting contractor	INR3-4/kg.
Selling price to primary processors	Average of INR11/kg.
Selling price to exporter	Average of INR44-51/kg for Totapuri mango pulp (1kg of pulp requires about 2 kg of mango to be processed).
Selling price to retailer	Average of INR26/kg.
Selling price to consumer	Average of INR30/kg.

Source: Study team

## 2) Stakeholder assessment

### a) Agricultural laborers

#### i) Role

Agricultural laborers provide labor to mango farmers (landowners) for work such as setting sticks for trellises and harvesting.

#### ii) Performance:

Payment is INR150-200 per day. Lunch and tea are provided by farmers/landowners.

#### iii) Resource (factors of production)

Skills: Their handling of mango is generally poor. As their payment is fixed regardless of the quality of their work, there is no incentive to improve their skills.

## **b) Farmers (landowners)**

### i) Role

The role of farmers (landowners) is to farm mango, including farm management and harvesting with the help of agricultural laborers.

### ii) Performance: percent

The selling prices for processing variety (Totapuri) were INR8-15 per kg. The price of processing mango is relatively stable. The yield of Totapuri is between 10 tonnes and 20 tonnes per acre. Cultivation of Totapuri is relatively easy, as it is not likely to be damaged and the volume of production is stable over the years (no alternate bearing). These factors have led farmers to grow Totapuri in recent years.

The cost of production is about INR10,000 -15,000 per acre. Mango farming, which requires a small amount of labor, seems to be rewarding even for small farmers.

### iii) External environment

There is little precipitation in this area, which means farmers have to invest in irrigation facilities.

### iv) Resource (factors of production)

Land: The majority of farmers are small farmers, but there are also a number of medium- and large-scale mango farmers.

Water: Supply of water is a major problem, as there is little rainfall and groundwater. The cost of boring is about INR100,000, which is a heavy burden. Each farmer has his own well, as the amount of water in each well is too small to share. There is a plan to build irrigation facilities.

Labor input: Mango farming does not require a lot of labor. Labor is needed for:

- Plowing : 3 times a year
- Spraying pesticide : 2-3 times a year
- Fertilizer: 2-3 times a year
- Pruning in the spring
- Harvesting is done by agricultural laborers. About ten laborers each acre are needed to harvest mango.

Other inputs: Most of the farmers do not use crates when transporting, but put mango directly into the trucks or tractors.

Skills and technology of farming: Most of the farmers exercise cultivating based on their experience, even though Horticulture Department gives regular training on cultivation to the farmers. Many farmers face problems in pest and disease and the demand for pest and disease control technology is high.

Skills for harvesting: Mango trees are 2-3 m high, and many fruit is collected by shaking the trees; this is likely to damage the fruit. Some farmers use net to harvest fruits.

#### v) Linkages

Many farmers take mango directly either to the markets or processors. The selling price does not differ for either case. No grading is done by farmers. Many farmers feel the purchasing price from processors is too low, as they do not have information on processors' cost structure or the selling price of final products. Those farmers who live far from the processing firms typically sell their mangoes to traders. The selling price for this case is 20-30 percent less than the case for direct sales to processors. Some farmers do not go to processor to sell his mango, as processor only buy mangoes of certain qualities and from the fear of risk to be exploited by processors.

Many small and marginal farmers are depended on traders for advanced payment or loan for them to pay for the inputs for cultivation. The commission rate from farmers to traders becomes 10 percent if the farmers get advanced payment or loan from traders whereas the commission rate without advanced payment or loan is 5 percent.

There are a few farmers' groups for mango. There is, however, no organization which is considered to be successful, and the performances of these organizations are generally poor. The promotion of FPOs by the SFAC, which has just started, is another attempt to promote the aggregation of farmers.

#### vi) Relevant government institutions

Same as the case of table purpose mango.

### **c) Commission Agents (CAs)**

#### i) Role

The role of a CA is as intermediary between farmers (sellers) and traders (buyers) at wholesale markets.

#### ii) Performance

CAs get 4 percent margin on sales value. Some farmers claim that the CAs often cheat farmers by imposing higher margin. Yet APMC states that such cheating does not exist. If such evidence is detected, the license of that CA will be cancelled.

#### iii) Relevant government institution

APMC manages the wholesale markets. Their responsibilities include the registration of AC and traders who can participate in the trade at the market, and setting up management rules, commission rates and registration rates based on the APMC Act. They are also responsible for managing the infrastructure of the wholesale markets.

### **d) Traders**

Same as the case of table purpose mango.

## **e) Processing firms**

### **i) Role**

The large scale aseptic firms process fresh mango into processed products such as puree and concentrate in aseptic containers. There are also some small scale canning firms which process fruits into canned products.

### **ii) Performance**

Large-scale aseptic firms are highly competitive in the international market. On the other hand, small canning firms have been losing competitiveness with the emergence of large aseptic firms.

### **iii) Resource (factors of production)**

Facilities: Many aseptic firms have large machinery and storage facilities for producing mango puree; this is suitable for large-scale production of a small number of products (not suitable for the production of small volumes of a large number of different products).

The facilities of small canning firms are typically quite old.

Skills and technology: Many aseptic firms have obtained certificates such as HACCP and ISO2200. They have adequate equipment for producing processed products hygienically. Yet there is room to improve hygienic conditions by increasing the awareness of workers. As the scale of a food processing business increases, there is increasing demand for specialists in food processing and food engineering. There is no university in this region that offers courses in these fields.

### **iv) Linkages**

Backward linkages: Processors buy fresh mango through markets or directly from farmers. When they buy from farmers, they buy at the market price. They generally do not agree procurement contracts with farmers. Many processors face the problem of procuring good quality mangoes, as large parts of mangoes they buy are damaged. They also face difficulty of procuring it in organized way, as they have to deal with large number of farmers to buy their mangoes.

Some processors give training and assistance to farmers, strengthening their relationship. Generally, however, there is little mutual understanding between processors and farmers.

Forward linkages: Large scale aseptic firms have good connections with large bottlers like Coca Cola. A large percentage of mango puree is exported. Domestic demand for mango puree is expected to increase rapidly.

Horizontal linkages: An association of aseptic firms was formed at the end of 2014. The main objectives of the association have not been clearly spelt out. Some members would like to set up guidelines for quality and procurement standards.

### **v) Relevant government institution**

Department of Horticulture: Some processors (like Jain) have a close relationship with the Department in providing training to farmers. They also receive subsidies for constructing facilities.

MOFPI provided a grant towards setting up Srimi Food Park Pvt. Ltd.

### 3) Value Chain Assessment

#### a) Evaluation of the Value Chain

The table below shows the result of SWOT analysis for the processing mango industries in AP. It indicates that the existence of large-scale aseptic plants which are highly competitive in the domestic and international markets, is the significant asset for the industries. The demand for their products is projected to increase in future, especially in the domestic market. The emergence of these plants has increased the choice of products and marketing channels.

On the other hand, there are rooms to improve the harvest and post-harvest handling and the linkages between farmers and processors, which will further strengthen the competitiveness of the industries.

Table 5-19: SWOT analysis for mango industries (for processing) in AP

Strength	Weakness
<ul style="list-style-type: none"> <li>• Large production volume</li> <li>• Agglomeration of large scale processors which are competitive in global market</li> <li>• Conducive investment climate</li> </ul>	<ul style="list-style-type: none"> <li>• Water shortage, pest and disease</li> <li>• Improper harvest and post-harvest handling</li> <li>• Weak linkage between farmers and processors</li> </ul>
Opportunity	Threat
<ul style="list-style-type: none"> <li>• Demands for processed mango products are increasing in both domestic and international markets</li> <li>• Some foreign investors in food processing industries are interested to do business in AP</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing competitions with other countries such as Kenya, Thailand, Philippines</li> <li>• Increasing labor costs</li> </ul>

*Source: Study team*

#### b) Potential for upgrading

In this region, an agglomeration of large horticultural processors including large aseptic plants and a large number of mango farmers give great potential for the development of horticulture farming and processing in the future.

There are, however, significant rooms for improving post-harvest management and procurement system of mango by processors, as many processors face the problem of procuring good quality mangoes and also face difficulty of procuring it in organized way. As the farming, processing and other supporting activities are inter-related, it would be beneficial to take a comprehensive approach to develop the whole value chain

of mango systematically by improving the efficiency and quality of farming and processing, and promoting linkages between these interrelated activities.

### **c) Bottlenecks**

Bottlenecks and constraints to upgrading the value chain include the following.

- Mango production
  - Water scarcity
  - Low quality farming and post-harvest management
  - Small scale of production by most of mango farmers
- Links between farmers and processors
  - Unorganized procurement system
  - Lack of trust between farmers and processors
- Processing
  - Low labor productivity and poor labor treatment
  - Poor marketing capabilities in the international markets

More detailed problem analysis on mango is given in ANNEX 8.

### **4) Need for assistance**

The assistance needed for the upgrade includes the following measures.

- Mango production
  - Provide training on farm management, including water management
  - Introduce standards and certificates
- Links between farmers and processors
  - Promote formation of farmer groups for collective shipment
  - Introduce guidelines for procurement and quality standards
  - Develop traceability system from farmers to processors
- Processors
  - Provide training to increase labor productivity
  - Provide training to improve product development
  - Provide training to improve marketing capabilities

## **5.2.5 Tomato**

### **(1) Overview of crop production**

According to the NHB, the total volume of tomato produced in 2013/14 was 3,354,470 tonnes; this is the highest in any state in India and around 18 percent of total tomato production in India. Madanapalle in Chittoor District is well known for its tomato production and market. Four-fifths of Madanapalle farmers depend on tomato farming for their livelihood. However, the average productivity of tomato in the state is 20 tonnes per hectare, which is almost the same as the national average of 21.2 tonnes per hectare, but only half of the productivity in Uttar Pradesh which is 40.6 tonnes per hectare. Seeds and seedlings of processing varieties are available. However farmers rarely cultivate processing variety because market price of processing variety is lower than table purpose variety.

### **(2) Current status and bottlenecks in the value chain**

#### **1) Overview of VC**

Tomato farmers conduct cultivation and harvesting with the help of agricultural laborers. Tomato farmers are typically small farmers with less than 1.2 hectares (3 acres). There are some organic tomato producers. One crop takes three months to grow, and they harvest tomato three times, Rabi (winter), summer, and Kharif (monsoon) season, a year.

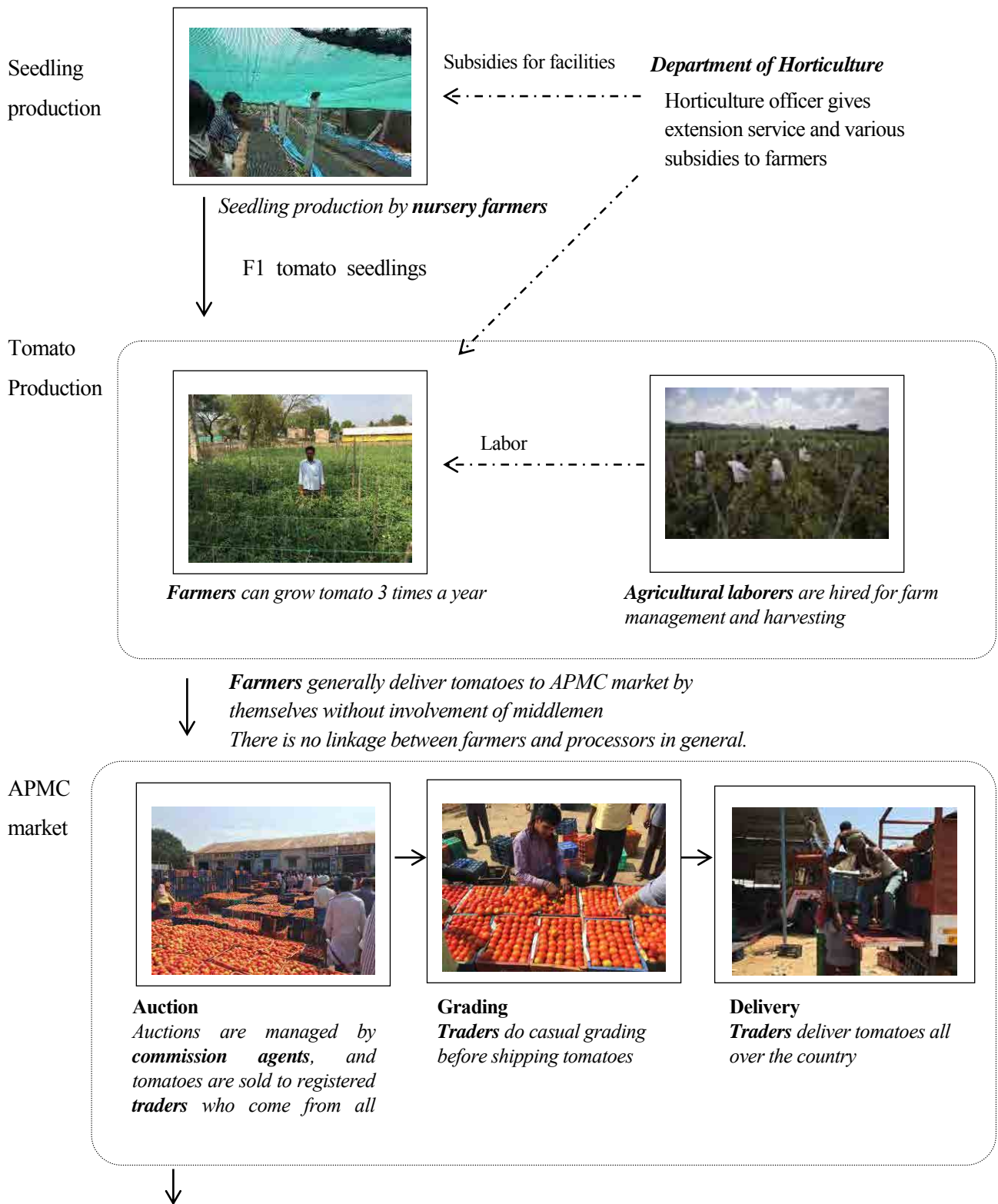
Farmers take their tomatoes to APMC markets for auction. Farmers generally do not sell their tomato to processing firms, as purchase prices of processing firms are low.

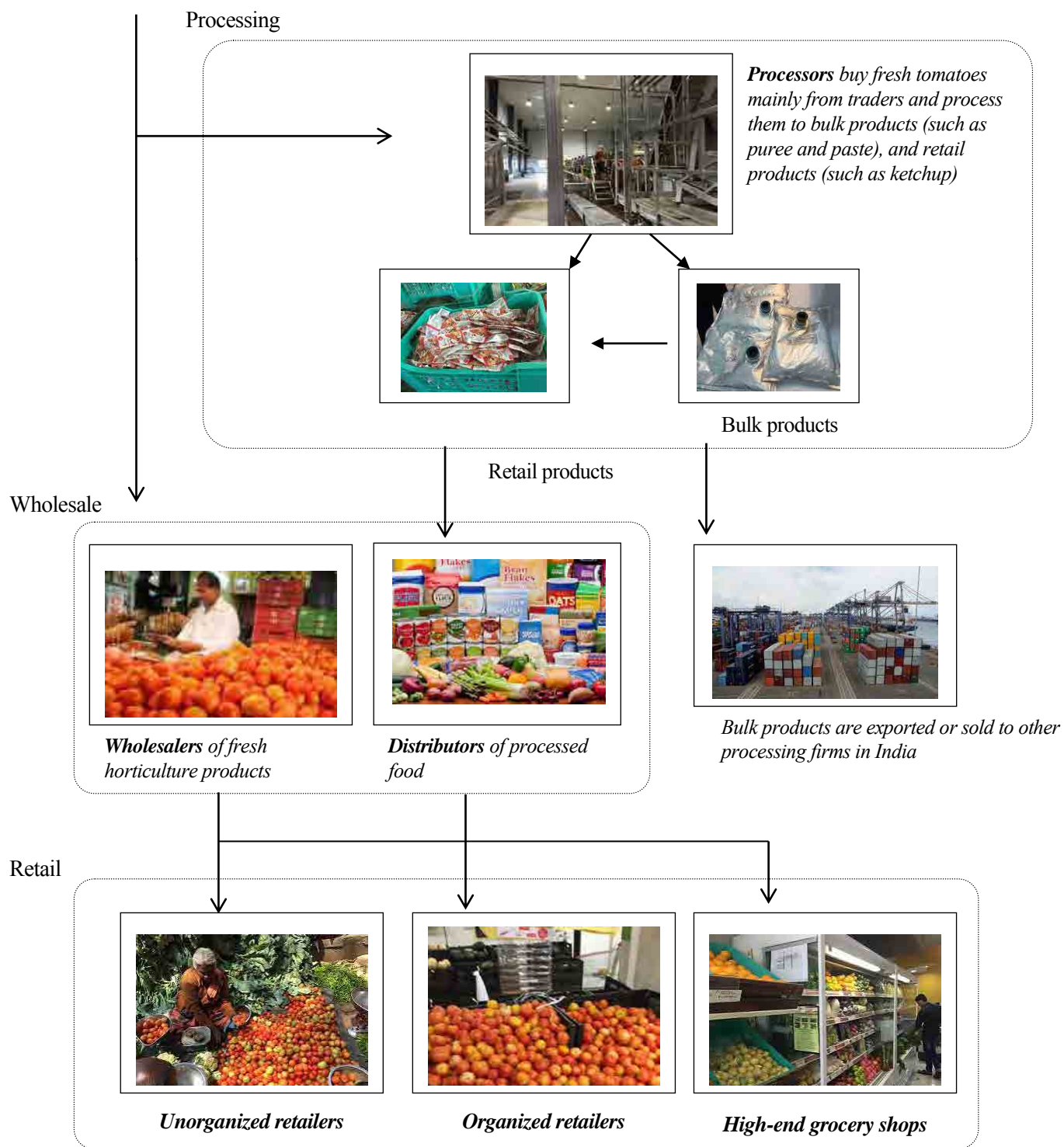
In Chittoor there are fourteen market yards for the auction of tomato. Madanapalle market is the biggest on about 7.6 hectares (19 acres), which dealt with about 99,073 tonnes in 2013/14. About 5,000 tomato farmers utilize Madanapalle market, and 200 trucks ship tomato all over the country every day.<sup>63</sup>

Traders deliver most of the fresh tomatoes to large-scale wholesalers all over the country. Farmers and wholesalers often engage in grading and packing.

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<sup>63</sup> *Brief note on the Agricultural Market Committee, Madanapalle*





Source and photos: Study Team

Figure 5-7: Tomato Value Chain in AP

There are a number of nursery farms in Chittoor that produce many types of seedlings of F1 varieties, such as 440, 448, 800 and DS810. Farmers buy these seedlings to grow tomato.

Farmers hire agricultural laborers for work such as setting sticks for trellises and harvesting. Majority of tomato farmers in Chittoor apply string trellis for tomato cultivation while majority of tomato farmers in other areas such as Krishna District don't. Agricultural laborers in the region are mainly landless rural residents from other states, such as Maharashtra and Odisha. They are employed by farmers/landowners through contractors. There are some laborers who live in the local area. They are landless, or those who cannot farm due to lack of water.

Commission agents are responsible for managing the auction at APMC markets: tomatoes are sold to registered traders, who transport them all over the country. They often do casual grading before shipping. There are 109 commission agents and 30 licensed traders in Madanapalle market.

There are six processing firms in AP which process tomato to paste. They obtain fresh tomatoes from traders, as they have no linkages to farmers. In 2010/11 the total amount of tomato paste produced in AP was 15,600 tonnes.<sup>64</sup> The large aseptic firms clearly have more capacity to produce tomato paste during the off-season of mango, yet difficulty in getting a stable supply of fresh tomato prevents them from producing paste on a large scale. The bulk products such as puree and paste they process are exported or sold to other processing firms who produce final products such as tomato ketchup in India. These processing firms in India import tomato pastes from China, United States, and so on. For example, Field Fresh Foods Private Limited which produces tomato products under the brand of Del Monte imports 60 percent of tomato paste from United States.<sup>65</sup> Industry insiders pointed out that those processing firms don't procure tomato paste made in India due to unstable supply and uncompetitive price.

Traders deliver most of the fresh tomatoes to large-scale wholesalers all over the country. Wholesalers often engage in grading and packing.

Tomatoes are then delivered to various types of retailer (organized and unorganized retailers, and small high-end grocery shops). It is usually difficult for organized retailers to form their own supply chain of tomato, so most of them procure it through the traditional supply chain.

The price of tomato changes through the value chain in the following way.

Table 5-20: Example of selling price of tomato at each sales point

Sales point	Price
Selling price at wholesale market	Average price is INR18/kg. The farmer will receive INR16/kg after deduction of commissions by commission agent explained below. The average wholesale price in 2013/14 has varied between

<sup>64</sup> Department of Horticulture Chittoor, Status of tomato cultivation in Chittoor district and strategies for promotion of marketing

<sup>65</sup> Interview with Marubeni Corporation

Sales point	Price
	INR2/kg and INR36/kg in Madanapalle market. The price at the time of survey, in March 2015, was INR3-5/kg, depending on the quality.
Selling price to commission agent/village trader (commission agent only facilitates the auction process and receives commission)	Commission as per APMC rule is 4percent. But in reality agents deduct 10percent from the payment to cover commission, marketing commission to buyer, wastage and handling. There is also a market fee of 1percent to be paid to the APMC.
Selling price to primary processors	Processing units process tomato when price is less than INR4/kg. Selling price to primary processor is in the range INR3-4/kg.
Selling price to exporter	Average INR48/kg.
Selling price to retailer	Average INR26/kg.
Selling price to consumer	Average INR35/kg. The price at the time of survey (March 2015) was INR7-10 in the cities. At high-end grocery shops in the cities it was INR20/kg.

Source: Study team

## 2) Stakeholder assessment

### a) Nursery farmers

#### i) Role

Nursery farmers grow the tomato seedlings that will be used by tomato farmers to grow tomato.

#### ii) Performance

The price of a seedling is INR0.5. They can produce 300,000 seedlings per 0.1 acre in twenty-one days, which gives about INR150,000 revenue per month per 0.1 acre.

#### iii) External environment

There is little precipitation in this area, so investment on irrigation facilities is needed for farming.

#### iv) Resource (factors of production)

Facilities: Nets are used to cover the seedlings, for which the Department of Horticulture provides 50 percent subsidy.

#### v) Linkages

Most of the farmers in the region grow tomato, so demand for seedlings is high.

#### vi) Relevant government institution

The Department of Horticulture provides 50 percent subsidy for the nets used in nurseries.

### b) Agricultural laborers

#### i) Role

Agricultural laborers provide labor to tomato farmers (landowners) for work such as setting sticks for trellises and harvesting.

## ii) Performance

Payment is INR150-200 per day. Lunch and tea are provided by farmers/landowners.

## iii) Resource (factors of production)

Skills: Their handling of tomato is generally poor. As their payment is fixed regardless of the quality of their work, there is no incentive to improve their skills.

## c) Farmers (landowners)

### i) Roles

Farmers (landowners) grow tomato, including farm management and harvesting.

### ii) Performance

The performance of tomato farmers is heavily dependent on the market price of tomato, which fluctuates wildly depending on the amount produced in other areas.

The yield of tomato varies between 50-75 tonnes per hectare (20-30 tonnes per acre), depending on facilities and availability of water.<sup>66</sup> The yield of tomato in Chittoor is significantly higher than the average yield of tomato in AP, 20 tonnes per hectare.<sup>67</sup>

According to the Department of Horticulture, approximately 90 percent of tomato farmers practice string trellis for tomato cultivation which increases production of tomato. In general it is said that tomato does not bear well if planted in the same place every time without special land preparation. However farmers in Chittoor repeatedly cultivate tomato in their limited land. It may causes poor tomato production comparing to potential of the variety.

The cost of production is about INR200,000-300,000 per hectare (INR80,000-120,000 per acre).

Some farmers seemed to be running at a loss at the market price (INR2-3 per kg) at the time of the survey, in March 2015. Yet they will get a huge profit if the price goes up to INR15 per kg, which it did summer 2014. On average, the income generated by tomato farmers in this area is more than that of average farmers in India.

### iii) External environment

There is little precipitation in this area, so investment is needed on irrigation facilities for farming.

### iv) Resource (factors of production)

Land: The majority of farmers are small farmers with an average landholding of about 0.4 hectare (one acre).

Facilities and equipment: Most farmers use trellises for growing tomato, and many use (tube) drip irrigation. The Department of Horticulture gives subsidies for these facilities.

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<sup>66</sup> Interviews with farmers and HOs

<sup>67</sup> National Horticulture Board (2011)

Water: Supply of water is a major problem as there is little rainfall or groundwater. The cost of boring well is about INR100,000, which is a heavy burden. Each farmer has his own well, as the volume of water in each well is too small to share.

Labor input: Labor for setting sticks and harvesting is heavily dependent on hired laborers. About twelve or thirteen labors per hectare (five laborers per acre) are hired for harvesting. The increase in labor costs is a major problem in farming.

Other inputs: Some farmers use organic fertilizers. Farmers use crates that are owned by CAs or farmers themselves to carry tomatoes to the market (in the case of Mandanapalli).

Skills for post-harvest handling: No grading or rough grading is done at farm level. The handling of tomato is quite poor.

#### v) Linkages

Almost all tomatoes produced at the farm go to APMC markets. Farmers generally do not sell their tomato to processing firms, as the purchase price is low.

In the case of Mandanapalli, farmers take their tomato by themselves without involvement of middlemen. For other markets in Chittoor, farmers who do not have access to the market sell their products to middlemen.

#### vi) Relevant government institutions

Department of Horticulture: As of March 2015, there are only ten HOs and ten Field Consultants (who support HOs) in Chittoor, which is not enough to cover the whole region. It was planned to recruit eight more Officers by March 2015.

HOs play the role of extension officer, giving farmers guidance on activities such as pest control and new cultivation methods. They sometimes organize exposure tours to observe progressive cultivation techniques in other regions.

There are various subsidies from the government (backward caste farmers are subsidized for full cost for these facilities)

- Seed: 50 percent subsidy (usual cost INR4,000 per acre)
- Trellises: 50 percent subsidy (usual cost INR15,000 per acre)
- Mulching sheets
- Micro irrigation.

### **d) Commission Agent (CA)**

#### i) Role

The CA is the intermediary between farmers (sellers) and traders (buyers) at the wholesale markets.

#### ii) Performance

CAs get 4 percent of the sales value.

### iii) Relevant government institution

APMC manages the wholesale markets. Their responsibilities include registration of CAs and traders who can participate in the trade at market, and setting up management rules, commission rates and registration rates based on the APMC Act. They are also responsible for managing infrastructure of the wholesale markets.

## **e) Traders**

### i) Role

Traders buy agricultural products at the auction and transport them all over the country. They also do casual grading before shipping the products.

### ii) Performance

The profit margin of traders is estimated to be about 10 percent.

### iii) Resource (factors of production)

Grading skills: Grading by traders at the market place is very casual. There is room to improve grading techniques.

### iv) Relevant government institutions

APMC manages the wholesale markets. Their responsibilities include registration of CAs and traders who can participate in the trade at market, and setting up management rules, commission rates and registration rates based on the APMC Act. They are also responsible for managing the infrastructure of wholesale markets.

## **f) Processing firms**

### i) Role

Processing firms process fresh tomato into processed products such as tomato puree, paste and sauce. There are six processing firms in AP which process tomato to paste.

### ii) Performance

The profit margin for tomato paste seems to be lower than for mango, as the price of the final processed products (mainly targeted at domestic markets) is not very high.

### iii) Resource (factors of production)

Facilities: Many processing firms have machines for aseptic and storage capacity to produce mango puree on a large scale. In the off-season for mango processing, they produce tomato puree. Their major business is mango processing and tomato processing is additional business for them. If the firms have machineries to concentrate mango puree, they can also produce tomato paste.

Skills and technology: Many processing firms have obtained certificates such as HACCP and ISO22000. They have adequate equipment for producing processed products hygienically. Yet there is room to improve hygiene and productivities by increasing the awareness and capability of workers.

iv) Linkages

Backward linkages: Processing firms have difficulty in procuring fresh tomato directly from farmers. Most processing firms buy only C-grade tomato, and the maximum buying price is INR5 per kg (otherwise it is not profitable to process). Although Jain Irrigation Systems Limited buys half of tomato from farmers directly to process and sell tomato paste to large bottlers and for export, majority of processing firms buy tomato from traders.

Forward linkages: Most of the processed tomato products are targeted at the domestic market. As the price of final products is not very high, the price processors pay for fresh tomato is low.

Horizontal linkages: An association of aseptic firms was formed at the end of 2014. The main objectives of the association have not been clearly set out. Some members would like to set up guidelines for quality and procurement standards.

v) Relevant government institution

MOFPI provided a grant towards setting up the integrated food park such as Srimi Food Park Pvt. Ltd.

## **g) Wholesalers**

i) Role

Wholesalers act as intermediaries and deliver on a large scale. They often engage in grading and packing. They also give finance to small traders.

ii) Performance

The profit margin for traders is estimated to be ten percent.

iii) Resource (factors of production)

Large wholesalers often have large cash resources at hand, so they provide finance to small traders.

## **h) Unorganized retailers**

i) Role

Unorganized retailers are responsible for retailing products. Unorganized retailers include Kirana stores, fruit and vegetables or product-specific outlets and vendors, and stalls on the streets, which are all small-scale.

ii) Performance

The profit margin of unorganized retailers is estimated to be 20 percent.

iii) Resource (factors of production)

For small retailers, access to credit is limited. They are typically dependent on private moneylenders for daily transactions, and have to pay high interest rates.

### **i) Organized retailers**

#### **i) Role**

Organized retailers are responsible for retailing products. Organized retailers include supermarkets, convenience stores, hypermarkets, and cash and carry shops.

#### **ii) Linkages**

It is usually difficult for organized retailers to form their own supply chain for agricultural products as contract farming is not popular in India. Most organized retailers rely on fragmented traditional supply chains to obtain fresh tomato. Reliance Limited which has 60 outlets in Bengaluru and 100 outlets in Hyderabad has set up ten collecting centers in Karnataka state and six collecting centers in AP state for their own procurement channel.

### **j) Small high-end food shops**

#### **i) Role**

Small high-end food shops are small grocery retailers in the big cities that sell high-end agricultural products including fresh vegetables and fruit to middle- or high-income households. The high-end market for fresh fruit in India is small, but is likely to grow.

## **3) Value Chain Assessment**

In order to evaluate the value chain of tomato in Chittoor, the SWOT analysis was conducted. The result is summarized into below table.

Table 5-21 SWOT analysis of tomato in Chittoor

Strength	Weakness
<ul style="list-style-type: none"> <li>• Large tomato production volume in AP</li> <li>• Suitable climate for tomato cultivation</li> <li>• Availability of high yield variety</li> <li>• Experienced farmers of tomato cultivation</li> <li>• Large subsidies and supports provided by government</li> <li>• Conducive investment climate</li> <li>• Good road connections to major cities in South India</li> </ul>	<ul style="list-style-type: none"> <li>• Weak linkage between farmers and processors</li> <li>• Less cultivation and less study of processing variety</li> <li>• Poor farm management</li> <li>• Water shortage</li> </ul>
Opportunity	Threat
<ul style="list-style-type: none"> <li>• High demand of tomato in India</li> </ul>	<ul style="list-style-type: none"> <li>• Large price fluctuation of tomato</li> </ul>

<ul style="list-style-type: none"> <li>• Increasing demand of processed tomato in domestic market</li> <li>• Increasing price of processed tomato from China</li> <li>• High interest of foreign investors in food processing industries in AP</li> </ul>	<ul style="list-style-type: none"> <li>• Stable supply of processed tomato from China and other countries</li> </ul>
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*Source: Study team*

### **a) Opportunity**

Tomato is essential for Indian cooking, so consumer demand is high. Because of increase in population, the demand of tomato, both fresh and processed, has been increasing.

India is importing tomato paste to produce tomato products such as tomato ketchup. However since import prices of tomato pastes has increased, there are huge opportunities for processing firms to substitute domestically produced tomato paste for imported tomato paste.

Foreign companies are also seeking the potentials and opportunities of tomato processing industries.

### **b) Strength**

#### **i) Large tomato production volume**

Tomato is a major horticultural product in Chittoor. Many farmers in this region grow tomato extensively for many reasons:

- The climate is suitable for tomato farming, and it can be grown throughout the year.
- Tomato cultivation, especially during summer season and Kharif season, is profitable for farmers compared with other agricultural crops.
- The scarcity of water in this region makes it difficult to grow other horticultural products.
- The introduction of hybrid varieties increased the yield of tomato production.

Although the average yield of tomato production in AP is only 20 tonnes per hectare,<sup>68</sup> the yield of tomato in Chittoor can be between 50 and 75 tonnes per hectare (20-30 tonnes per acre). Some progressive farmers said that they can produce 100 tonnes or more per hectare.<sup>69</sup> The high penetration rate of the string trails for tomato cultivation and well experienced farmers seem to push up production per hectare.

#### **ii) Large subsidies and supports provided by government**

The government provides large subsidies and extensive support to tomato farmers. The Department of Horticulture said that they acquired enough budgets for subsidy of installment of drip irrigation throughout Chittoor. The government also provides subsidy for crate for tomato transportation as well as installment of string trellis.

<sup>68</sup> National Horticulture Board (2011)

<sup>69</sup> Interviews with farmers and HOs

iii) Good road connections to major cities in South India

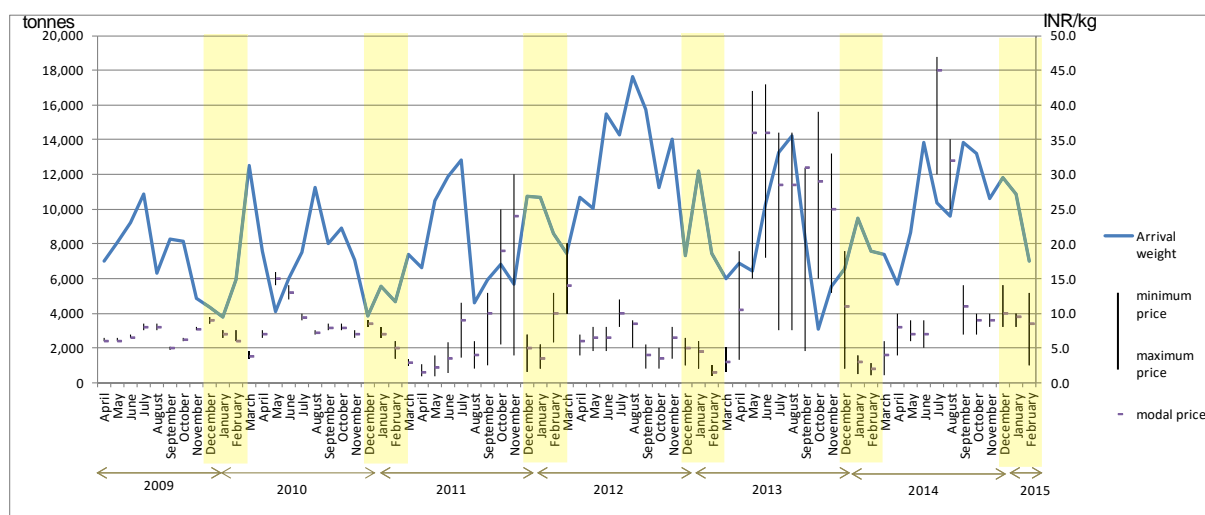
Chittoor is located in the middle between Bangalore and Chennai along with Bangalore-Chennai corridor developed by Japanese government’s assistant.

**c) Threat**

i) Large price fluctuation of tomato

Another important feature of the value chain is the tremendous fluctuation in the selling price of tomato over the last several years, partly as a result of supply fluctuation in other areas. This makes the income of tomato farmers unpredictable, even though they may get large profits when the price of tomato goes up.

Figure 57 shows a range of price (minimum price, maximum price and modal price), and the arrival volume of tomato in Madanapalle market from 2009/10 to 2014/15.<sup>70</sup> For example in 2013/14, the lowest modal price of tomato in Madanapalle market was INR2.0 per kg in February 2014 while the highest modal price was INR36 per kg in May and June 2013. Figure 5-8 indicates the market price tends to go down from December to February, the harvest season of Rabi season highlighted by yellow in the figure. Therefore if tomato processing firms can have agreement with farmers to buy all production at reasonable price, e.g. INR 5-6 per kg, during the Rabi season, the agreement may bring stable income to farmers and stable procurement to processing firms.



Source: Brief note on the Agricultural Market Committee, Madanapalle

Figure 5-8 Trend of tomato market price and volume of arrival in Madanapalle market

<sup>70</sup> Brief note on the Agricultural Market Committee, Madanapalle

ii) Stable supply of processed tomato from China and other countries

According to discussion with some processing firms, not only price but also stable supply of tomato paste is crucial for tomato processing companies such as Unilever and Nestle who procure tomato paste to produce tomato ketchup etc. Although those companies require bulk, such as 10,000 tonnes, of tomato paste constantly, only a few domestic companies can meet their requirements.

**d) Weakness**

i) Weak linkage between farmers and processors

A major characteristic of the value chain of tomato in this region is that almost all the tomato is delivered to APMC markets, where tomato is auctioned and then transported all over the country. This indicates that there are a limited number of marketing channels for the farmers.

The price fluctuation makes it risky for tomato processors to carry out their processing business, as it is difficult to get a stable procurement of tomato with reasonable price. One of the solutions can be contract farming of tomato. The Global Green Company Limited which has headquarters in Bangalore has started contract farming of tomato in Karnataka and outsources processing to Srinivaas Mega Food Park Pvt. Ltd. However contract farming of tomato is quite limited.

ii) Less cultivation and less study of processing variety

Farmers in Chittoor are not willing to cultivate processing variety because they believe that they can get better price with table purpose variety in APMC market. Therefore processing firms in Chittoor have to use table purpose variety which is less efficient for processing. If processing firms can procure processing variety which makes them produce same amount of tomato paste with less volume of fresh tomato, they may be able to pay higher price to farmers as keeping their profit.

Majority of farmers in developed countries such as United States and Japan cultivate processing variety without string trellis to maximize their profitability.

The scientific study on processing variety and appropriate farming practices for the processing variety are required for tomato processing industry.

**4) Bottlenecks**

Bottlenecks and constraints for the upgrade of the value chain include the following.

- A strategy to promote processing industry or high value addition of tomato and other horticulture crops is not developed.
- The scientific study on processing variety and appropriate farming practices for the processing variety are neither studied nor verified at all.
- The varieties of tomato currently produced are not suitable for processing

- Linkages between farmers and processors/retailers as well as trust between farmers and processors are missing
- Quality of post-harvest management including grading is poor
- Marketing capability of the farmers is poor

More detailed problem analysis on tomato is given in ANNEX 8.

## **5) Need for assistance**

Assistance needed for the upgrade would include the following measures.

- Develop, verify, and demonstrate new variety that are suitable for processing as well as farm management techniques which reduce cultivation cost and maximize farmers' profit
- Encourage farmers to introduce new varieties that are suitable for processing and apply appropriate farm management techniques for the new processing variety on part of their land or in part of a season especially Rabi season when the market price of tomato tends to be low
- Promote linkages between processors and farmers, whereby processors buy tomato at pre-determined prices and farmers comply with the promise to sell to the processor
- Provide training to processors for upgrading and standardizing food processing operation such as contract farming, material handling, 5S, Kaizen, and food safety
- Promote technical upgrade of farming by supporting the introduction of facilities like greenhouses and Polythene sheets, and certificates and standards

## **5.2.6 Chili**

### **(1) Overview of crop production**

The total volume of chili produced in AP in 2013/14 was 601,990 tonnes; this is the largest state production, and around 40 percent of total chili production in India.<sup>71</sup> Guntur District is well-known for chili production. The APMC market in Guntur is exclusively a dry chili market. The average productivity of chili in the state is 4.58 tonnes per hectare,<sup>72</sup> which is the highest in India, and more than double the national average of 1.93 tonnes per hectare. AP provides 70 percent of India's chili exports, and Guntur chili market contributes 40 percent of these exports. Exported chili is sometimes rejected from importing countries, especially developed countries, because of agrochemical residues or aflatoxin. The major varieties grown are Guntur Sannam, Ankur, Wander hot, Byadgi, Teja, Nandhari and Agnirekha. Chili is used as a spice in food, for extraction of oleoresin, and for color. Dried chili is traded as a commodity both in Indian and international markets.

### **(2) Current status and bottlenecks in the value chain**

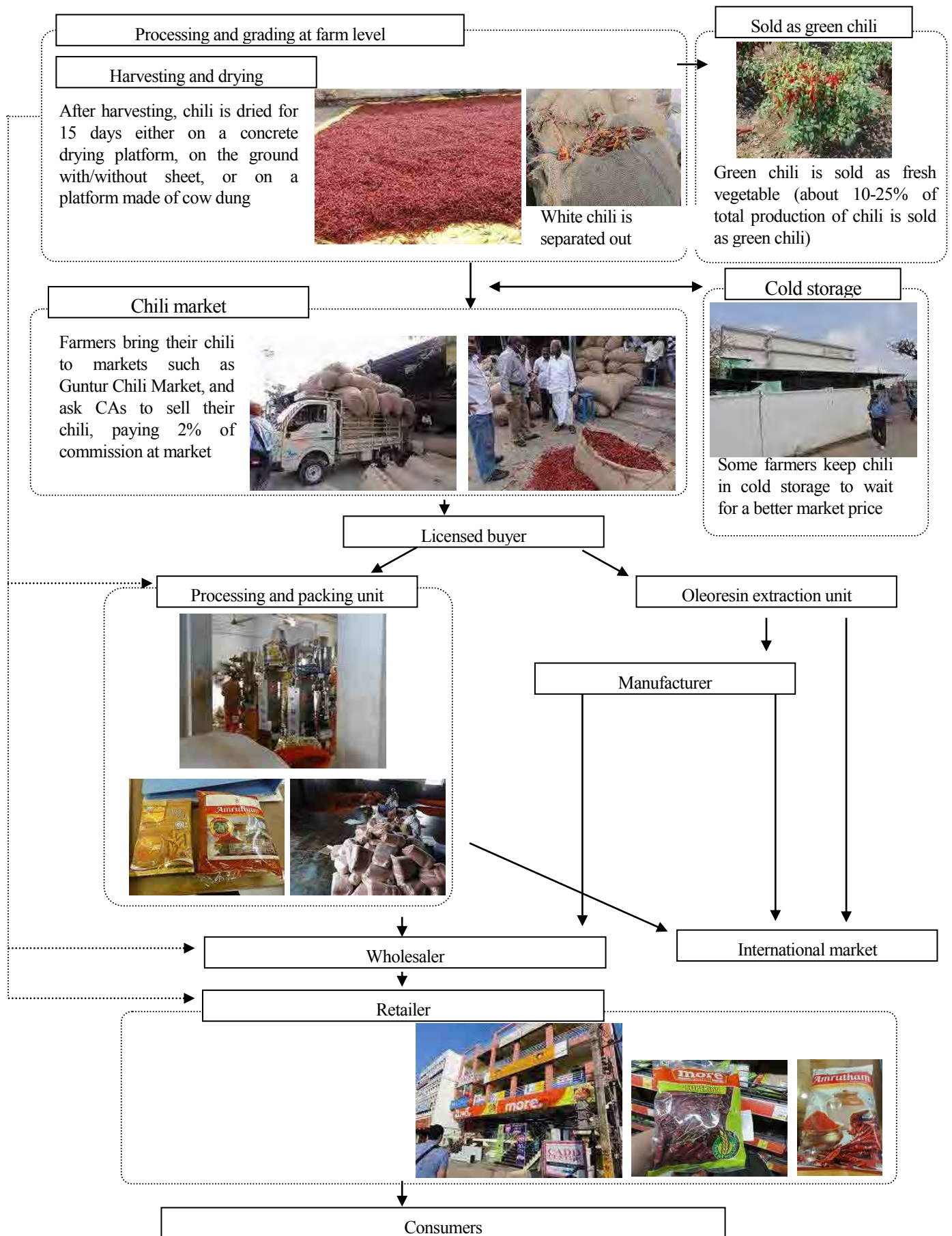
#### **1) Overview of VC**

Figure 5-9 depicts an overview of the dry chili value chain in Guntur. Some 10-25 percent of chili is sold as fresh green chili. The remaining chili is harvested after the color of the pod turns red. The harvested red chili is dried under the sun at farm level for fifteen days, put into 40-45 kg gunny bags, and then brought to the APMC market either by the farmers themselves or by transporters hired by farmers. Once farmers bring their chili to the market, CAs receive the product and sell it to buyers. Some processors, wholesalers and exporters purchase dried chili directly from farmers, but there is limited direct purchasing. More than 90 percent of dried chili in Guntur is sold through the APMC market.

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<sup>71</sup> Horticulture Board - Area and Production Estimates for Horticulture Crops for 2013-14

<sup>72</sup> Horticulture Board - Area and Production Estimates for Horticulture Crops for 2013-14



Source and photos: Study Team

Figure 5-9: Outline of value chain of chili in Guntur

Only licensed CAs and licensed buyers can sell and buy the products in the market. The dried chili is sold through open auction at the market, and sale and purchase are generally carried out by mutual negotiation between licensed CAs and licensed buyers. Once a buyer tells a price, the CA asks the farmer who brought the chili whether the farmer agrees to the price or not. If the farmer agrees the price, the deal is concluded. The market receives about 300,000 tonnes of dried chili annually.

Farmers and traders use cold storage to store dried chili until there is a better market price. According to NABARD in Guntur, there are 80 cold storages in Guntur city and 120 cold storages in Guntur district.

The dried chili is mainly used in cooking, while some is processed to extract color or oleoresin. The extracted color and oleoresin are used for food, pharmaceutical products, cosmetics, etc. The largest oleoresin extractor in India set up an oleoresin extraction unit in Guntur, and procures 10,000 tonnes of chili annually.

Table 5-22 shows the price of dried chili at each stage of the value chain. As mentioned above, the selling price at the APMC market is determined thorough open auction, based on its variety, quality, market demand and other factors. The varieties of chili are categorized into three types: i) common varieties, ii) special varieties, and iii) white variety. Varieties such as 334, 231, 273, No.5, Rossini, Guntur, and Sannalu, which are cultivated commonly, are recognized as common varieties, while varieties such as Teja, Badiga, Wonderhot, Devanoor Deluxe and Deepika are recognized as special varieties or premium varieties, and sell at a higher price than common varieties. Low-grade products rejected from any variety are called white variety, and are sold at a lower price than the common varieties. The major attributes of chili are its pungency and color. Buyers select varieties based on their purpose. The price of common varieties at APMC market range from INR36 per kg to INR88 per kg, and INR65 per kg was the mode price in 2014/15.

When purchasing directly from farmers, buyers tend to give a premium price slightly higher than the market price. Small chili processing units may charge INR6 per kg for grinding and about INR100 per kg for packaging. The retail price at a supermarket can be about INR200-300 per kg, or more for organic or premium quality.

Table 5-22: Price of dried chili and dried chili products

Sales point	Price
Price farmers receive	Average price INR63-68.6/kg <ul style="list-style-type: none"> <li>• 2-10percent of selling price at the APMC market is deducted for commission of CA and other expenses</li> </ul>
Selling price at APMC market	Average price INR70/kg <ul style="list-style-type: none"> <li>• Common variety: INR36-88/kg, mode INR65/kg in 2014/15</li> <li>• Special variety: INR55-106/kg, mode INR90/kg in 2014/15</li> </ul>

Sales point	Price
	<ul style="list-style-type: none"> <li>White chili: INR15-72/kg, mode INR60/kg in 2014/15</li> </ul>
CA	Commission agents receive 2percent++ of selling price at the APMC market as commission
Licensed buyer	Licensed buyers pay 1percent of purchasing price to the APMC market
Selling price to primary processors	<p>Average price is INR80-110/kg</p> <ul style="list-style-type: none"> <li>INR6/kg for grinding</li> <li>About INR100/kg for retail packaging</li> </ul>
Direct purchase price of processors/exporters	<p>INR80/kg</p> <ul style="list-style-type: none"> <li>Special varieties have an additional premium, approximately INR5/kg, on the market price of APMC market</li> </ul>
Selling price of chili powder to wholesalers	INR130/kg
Selling price of chili powder to consumers at supermarket	<p>INR200-300/kg</p> <ul style="list-style-type: none"> <li>Organic whole chili is sold at INR45/100g (INR450/kg)</li> </ul>

Source: Study team

## 2) Stakeholder assessment

Various players, including farmers, APMC market, CAs, cold storage, wholesalers, processors and retailers are involved in the value chain of chili. The current situation of each stakeholder is summarized below.

### a) Farmers

Farmers harvest, dry, sort into good quality and white variety, and take the dried chili to the APMC market. Special varieties can be sold at a higher price at the market - the seeds of the special varieties, such as Teja, are expensive: Teja seeds cost INR2,500 per kg, while the seeds of the common varieties, such as 334, cost INR650 per kg. When farmers cultivate Teja, they ask nurseries to germinate and grow their seeds for forty to forty-five days, paying 60 paisa or more per seedling.

Drying chili properly is critical if the chili is to be exported. Without proper drying chili may go moldy and the mold can produce aflatoxin, which can cause liver damage and cancer. The Japanese government has introduced legislation to ban importing chili which contains more than ten µg per kg of aflatoxin, and other developed countries such as the EU and United States have similar regulations. Agrochemical residue can be another problem for export. Therefore proper pesticide management and proper drying practices are crucial for processors who export their products. Some processors-cum-exporters, such as Synthite Industries Ltd. and ITC Ltd., purchase dried chili directly from farmers for the traceability. When farmers

practice IPM or Integrated Crop Management (ICM), processors pay a premium price to farmers. However the amount purchased directly is still limited.

**b) APMC market**

APMC market in Guntur is Asia’s largest chili market. The market yard is located five km from the central of Guntur town, over 20 hectares (50 acres). The market receives 300,000 tonnes of dried chili every year, as shown in Table 5-23.

Table5-23: The amount of chili received in APMC market

	2010/11	2011/12	2012/13	2013/14	2014/15
Chili arrivals in quintal (100 kg) bags	3,508,165	2,976,679	2,965,010	3,303,050	3,054,996

Source: Agricultural Market Committee, Guntur

CAs and buyers who deal with selling and purchasing in the market have to be licensed by the market. As of March 2015, the market has 582 licensed CAs, and 337 licensed chili buyers. During the peak season from January to July, more than 50,000 quintals of dried chili (5,000 tonnes) and 2,000 to 3,000 farmers come to the market every day.<sup>73</sup>

The open auction begins at 7 a.m. and ends largely at 9 a.m. After verification of quality and stocks, buyers tell their price. Once a farmer agrees with a price offered by a buyer, the auctioneer issues an auction slip. The licensed weight men weighs the produce and issues a sales slip. Charges are made for both weighing and other activities, such as stitching bags and unloading bags. This may be a reason why farmers and other stakeholders claim that farmers have to pay more than two percent commission at the market. Some stakeholders also say that the weight of chili is not properly measured.

Officers at the market claim that during the peak season the market is congested and it needs to be expanded; the traffic jam surrounding the market is another issue. Therefore APMC has submitted a proposal to the AP state government to move the market to another location with a larger acreage.



<sup>73</sup> Agricultural Market Committee, Guntur



Photos: Study Team

### c) CAs

CAs are licensed agents operating in the APMC market, and facilitate the buying and selling process. CAs are required to charge two percent of sales to farmers as a service charge. CAs generally provide loans to farmers at two percent monthly interest. It is said that 50-70 percent of chili farmers borrow money from CAs.

### d) Licensed buyers

Licensed buyers work in the APMC market and facilitate the buying and selling process with CAs. They are required to pay one percent of sales to the market as market fees. In 2013/14, this realized INR4,573 lakh. Market fees are used for maintenance of the market, and welfare schemes such as free lunch and reasonably-priced accommodation for farmers who use the market.

### d) Cold storage

There are 80 cold storage facilities in Guntur town, and 120 in Guntur District. Cold storage is mainly used for dried chili. There is an association of cold storage companies in Guntur, and they set the storage fee - INR20/bag for a month and INR90/bag for a season. Farmers or traders keep their products in cold storage and wait until the market price rises.



Photos: Study Team

### e) Wholesalers or traders

Wholesalers or traders work as intermediaries between licensed purchasers and processors/exporters, or between processors and retailers.

#### **f) Small- or medium-scale processors for chili powder**

There are some fifty chili grinding mills in Guntur. Chili powder is packed for bulk buyers or retail sellers. Some grinding mills directly export their products.



*Photos: Study Team*

#### **e) Processors for export of whole or powdered chili**

In order to avoid agrochemical residue and aflatoxin in chili powder, exporters provide technical assistance to farmers and try to buy chili directly from the farmers.

ITC Ltd. entered the spice business about ten years ago, and has an office for their agribusiness division in Guntur. ITC mainly procures four spices - chili, turmeric, coriander and cumin - and sells 50 percent of their products to the domestic market and 50 percent to the international market. The company procures about 20,000MT of spice annually. In order to procure safe spice that does not contain agrochemical residue or aflatoxin, they provide technical assistance to farmers and buy spices directly from farmers. In 2013 they also introduced the ICM village approach - this targets a whole village, providing both agricultural assistance such as IPM and ICM, and necessary support for the community such as school rehabilitation. Currently ITC works in six villages: three villages in Warangal District, Telangana State; one village in Kurnool District, AP State; and two villages in Prakasam District, AP State. ITC procures 10-15 percent of its spices from these ICM villages, and plans to increase the amount obtained from ICM villages.

#### **f) Processors for oleoresin or color extraction**

Synthite Industry Ltd. is the third largest oleoresin extraction company in the world, and the largest in India; it produces 30 percent of world oleoresin. They have a headquarters in Kerala and processing units in

six different places, including Guntur. The processing unit in Guntur was established in 2013, and mainly processes chili for oleoresin extraction. Chili can be used for extraction of color. However since chili varieties produced in Guntur are not suitable for color extraction, this is done in other states where appropriate chili varieties are available. The oleoresin is sold in both the domestic and international markets: 10 percent of Synthite’s products are sold in the domestic market, and 90 percent are sold in the international market. A proportion of these exports go to the Japanese market. Since market demand has been increasing, Synthite is targeting fifteen percent annual sales growth.

**g) Spice Board of India**

The Spice Board of India is the statutory commodity board under the Ministry of Commerce and Industry, and is responsible for export promotion activities for spice products. They have a head office in Kerala and some regional offices in major spice-producing areas. There is a regional office in Guntur, mainly focusing on chili.

The Spice Board has three wings: a) a development wing, which supports farmers; b) marketing wing, which regulates or supports processors and exporters; and c) Quality Laboratory, which examines agrochemical residue and other harmful ingredients. The Spice Board provides support to farmers with such schemes as training on quality improvement, techniques for drying chili and IPM, as well as provision of subsidies for machinery in order to improve quality and food safety.

They have had a plan to establish a Spice Park in major spice-producing areas for several years. However the Spice Park in Guntur is still not functional.

**3) VC assessment**

In order to evaluate the value chain of chili in Guntur, the SWOT analysis was conducted. The result is summarized into below table.

Table 5-24: SWOT analysis of chili in Guntur

Opportunity	Threat
<ul style="list-style-type: none"> <li>• Demand of chili (whole/powder) in both domestic and international market is increasing</li> <li>• Demand of oleoresin, which is extracted from chili, is increasing in international market</li> <li>• Price of dry chili is competitive in international market</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness about food safety such as agrochemical residue and aflatoxin is rising especially in international market</li> <li>• Competitions with other countries such as China is high because aflatoxin free chili is available in China</li> </ul>
Strength	Weakness
<ul style="list-style-type: none"> <li>• Production volume of chili in AP is the largest</li> </ul>	<ul style="list-style-type: none"> <li>• Aflatoxin is generated because of inappropriate</li> </ul>

<p>in India</p> <ul style="list-style-type: none"> <li>• There is the Asian largest chili market in Guntur</li> <li>• The world's largest producer of value added spices has an oleoresin extraction factory in Guntur</li> <li>• Spice Park is planned to be established in Guntur</li> <li>• Guntur chili has good reputation in India as well as international market</li> <li>• Supporting services and facility by Spice Board are available for chili in Guntur</li> <li>• Investment climate is conducive in AP</li> <li>• Road connections to major cities in South India is good</li> <li>• Port facility for export is well established</li> </ul>	<p>drying method</p> <ul style="list-style-type: none"> <li>• Agrochemical is remained because of poor farm management</li> <li>• India chili has negative reputation as unsafe</li> <li>• Productivity of farmers is low</li> <li>• Production cost is high</li> <li>• Linkage between farmers and processors is limited</li> <li>• Testing laboratories or testing kits for agrochemical residue and aflatoxin are limited</li> <li>• Varieties for extracting color are not cultivated</li> </ul>
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Source: Study team

### a) Opportunity

The chili industry in AP state has high potential. Since AP is the largest dried chili-producing state in India, chili is exported to other states and the international market. Because of the increase in population in India, the demand for chili in the domestic market will probably increase. The proportion of export is relatively small. However, considering food diversification in the world, the demand for spices including chili will increase. The industry says that Indian chili has price competitiveness in the international market.

### b) Strength

There are a lot of strengths on chili in AP as introduced below.

#### i) Large production volume and various varieties which are suitable for food as well as extraction purposes

The volume of dried chili produced in AP state is the largest in India. Since farmers in AP have traditionally cultivated chili, farmers understand methods of cultivation.

Many varieties, including hybrid varieties, are available for farmers. Teja, a hybrid variety, is suitable for food as well as extraction purposes. It is popular among farmers because of its high yield.

#### ii) Establishment of Asia's largest chili market in Guntur

The APMC market in Guntur is Asia's largest chili market; it is working as an important hub in the value chain of chili, as well as a price-determining market. Since it is congested during the peak season, it may need to expand or move to another location.

### iii) High value addition on chili

The chili industry in AP State can be promoted by increasing its value. Value addition can be realized in two ways: processors to process high value-addition products, and farmers to cultivate/dry in a better way.

There are about fifty grinding mills which generate value addition to chili in Guntur. In addition there is an oleoresin extraction unit. Value addition to chili can be made through supporting these private companies.

### iv) High profitability to farmers

According to discussions with farmers, farmers believe that production of chili is highly profitable. With hybrid varieties farmers can harvest five tonnes or more of dried chili per hectare (two tones per acre), with a value of INR350,000 per hectare (140,000 per acre) if the market price is INR70 per kg. However some claim that the cost of production of dried chili is high; INR250,000 investment per hectare (INR100,000 investment per acre) may be required.

Although cultivation of chili is profitable compared to other crops it can be improved in many ways, including: proper drying practices can reduce post-harvest loss and reduction in quality; soil analysis and proper fertilization can reduce production costs; the Horticulture Department said that making a furrow 6 inches high can reduce disease problems; IPM can control pests, resulting in less use of agrochemicals and reducing the production cost; and once farmers have a linkage with processors/exporters they have a chance to receive technical assistance, and get a better price for producing better products. By improving agricultural practice and improving linkages with processors/exporters, farmers can improve their income.

## **c) Threat**

Agrochemical residues and aflatoxin generated by molds are harmful to humans and should be excluded from food. Although there is high potential for chili export, agrochemical residue and aflatoxin hinder export to developed countries; developed countries such as the EU, United States and Japan have legislation to ban importing chili contaminated by agrochemical residue and aflatoxin. In order to increase export to those countries, it is necessary to observe IPM, as well as proper drying practices.

China, one of major chili producing countries, can produce aflatoxin free chili thanks to its climate which is not suitable to generate mold.

## **d) Weakness**

Food safety issues are critical especially when India intend to export chili to developed countries whose regulation on aflatoxin and agrochemical residue is strict.

Aflatoxin is generated because of inappropriate drying methods. Agrochemical residue is caused by poor farm management. Once agrochemical residues and aflatoxin can be controlled, India has high potential to increase export of dried chili to developed countries such as the EU, United States and Japan,

since Indian dried chili is competitive in price. The industry said that 90 percent of imported dried chili in Japan comes from China. Diversifying the origin of import should also bring benefits to Japan, such as securing the stable supply.

Some large exporters invested and have their own laboratory to analyze agrochemical residue, aflatoxin, and other harmful materials. Although Spice Board and some research institutes provide testing services for exporters who do not have own facility, it is said that they are not sufficient.

More detailed problem analysis on chili is given in ANNEX 8.

### **e) Potential for upgrading VC**

Based on the above, there are the following possibilities for upgrading the VC.

#### **i) High value addition on chili**

The chili industry in AP State can be promoted by increasing its value. Value addition can be realized in two ways: processors to process high value-addition products, and farmers to cultivate/dry in a better way.

There are about fifty grinding mills which generate value addition to chili in Guntur. In addition there is an oleoresin extraction unit. Value addition to chili can be made through supporting these private companies.

#### **ii) Better income to farmers**

Although cultivation of chili is profitable compared to other crops it can be improved in many ways, including: proper drying practices can reduce post-harvest loss and reduction in quality; soil analysis and proper fertilization can reduce production costs; the Department of Horticulture said that making a furrow 6 inches high can reduce disease problems; IPM can control pests, resulting in less use of agrochemicals and reducing the production cost; and once farmers have a linkage with processors/exporters they have a chance to receive technical assistance, and get a better price for producing better products. By improving agricultural practice and improving linkages with processors/exporters, farmers can improve their income.

#### **iii) Increase exports to international markets, especially Japan**

Once agrochemical residues and aflatoxin can be controlled, India has high potential to increase export of dried chili to developed countries such as the EU, United States and Japan, since Indian dried chili is competitive in price and quality. It is said that Guntur chili is famous in international market. Promoting Guntur chili as good quality as well as safety products can be one way to accelerate exports of Guntur chili. The industry said that 90 per cent of imported dried chili in Japan comes from China. Diversifying the origin of imported dried chili should also bring benefits to Japan in terms of food security.

In order to explore this potential, the following three bottlenecks need to be overcome.

- *No application of proper IPM/ICM by farmers*
- *Improper drying practices*
- *Limited direct linkages between farmers and processors/exporters.*

#### **4) Need for assistance**

The need for assistance can be categorized into assistance for public sector such as governments and research institutes, farmers, and for processors/exporters.

a) For public sector such as governments and research institutes

- Promote Guntur chili brand
- Facilitate linkage between farmers and processors/exporters
- Enhance capacity of existing laboratories for analysis of agrochemical residues and aflatoxin

b) For farmers

- Encourage farmers to formulate farmers group by providing enough incentive for better linkage with processors/exporters
- Provide training in better farming practices, such as IPM, ICM, and proper drying practices
- Help farmers to introduce physical infrastructure, such as dry platforms or dry houses

c) For processors/exporters

- Provide training for supply chain management including traceability
- Provide training for quality management and productivity improvement such as 5S, Kaizen, and food safety
- Support marketing links with importers.

## 5.3 Priority state 2: Telangana<sup>74</sup>

### 5.3.1 Overview of the state

#### (1) General overview

Telangana region was part of Hyderabad State from 1948 to 1956, when it was merged with Andhra State to form AP State. After decades of movement for a separate state, Telangana was created by passing the AP State Reorganization Bill in both Houses of Parliament. On 2 June 2014, the state of Telangana was born as the twenty-ninth state in India, separated from AP, with the city of Hyderabad as its capital. Hyderabad will continue to serve as the joint capital city for AP and Telangana for a period of not more than ten years. Telangana has an area of 114,840 km<sup>2</sup> and is the twelfth largest state in India.

The religious composition of Telangana is 86 percent Hindu, 12.4 percent Muslim, 1.2 percent Christian, and 0.4 percent others. About 76 percent of the population of Telangana speak Telugu, 12 percent speak Urdu, and 12 percent speak other languages. According to the 2011 census, Telangana's literacy rate is 67.22 percent: male literacy is 75.6 percent and female literacy is 58.77 percent. Hyderabad District has highest literacy with 80.96 percent, and Mahboobnagar District has the lowest with 56.06 percent.

Table: 5-25: Overview of Telangana State

Governor	Sri E.S.L. Narashimhan
Chief minister	Sri K. Chandrashekar Rao
Area	114,840 km <sup>2</sup>
Number of districts	10
Number of mandals	464
Population	35,193,978 (2011 census)
Household	835,800
Rural population	21,585,000
Urban population	13,609,000
Literacy rate	66.46%

Source: Telangana state government portal <http://www.telangana.gov.in/>

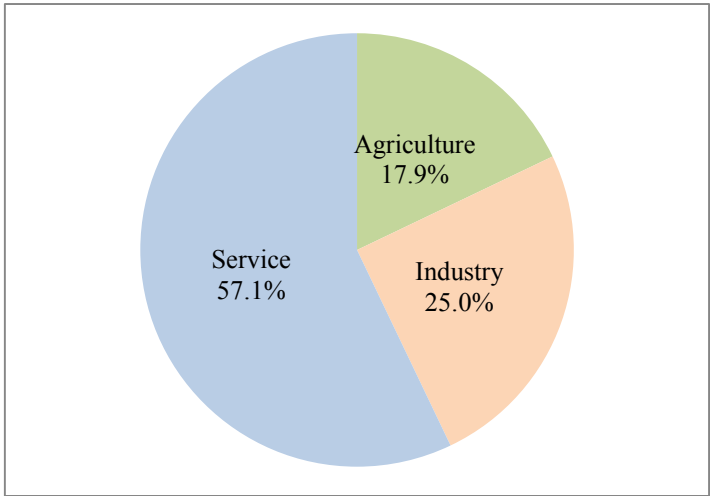
#### (2) Sector overview

The economy of Telangana is largely driven by agriculture, but several major manufacturing and service industries are growing mainly around Hyderabad. The following industries are active in the manufacturing sector: automobiles and auto components, textiles and apparels, pharmaceuticals, and cement and mineral-

<sup>74</sup>As indicated in 5.1 (4), description of this section is not as detailed as that of AP since the additional survey (third field survey) was conducted only in AP.

based. The state government is promoting an industrial incentive policy to create quality infrastructure and a congenial industrial environment for Telangana to be an attractive investment destination for both foreign and domestic investors, with special emphasis on creating an enabling socio economic system for under-privileged people. In the service sector the state has started to focus on the field of information technology - Hyderabad is sometimes nicknamed Cyberabad, as major software industries have set up offices in the city.

The state government is in the process of developing Industrial Parks in different places, for specific groups of industries. The existing parks are Software Park and HITEC City for software units in Hyderabad, Apparel Park in Gundlapochampalli, Export Promotion Park in Pashamylaram and Bio-technology Park in Turkapally.



Source: *Telangana Socio Economic Outlook 2015*

Figure 5-10: Sectoral share of GSDP at current prices (2014/15)

According to *Telangana Socio Economic Outlook 2015*, the change in the relative sectoral share in GSDP manifests a structural change in the economy. The growth rate of GSDP is highest in the service sector with 9.7 percent, followed by the industry sector with 4.1 percent growth, and the agriculture sector expecting negative growth of -10.3 percent (attributed mainly to adverse seasonal conditions). The state has witnessed a fall in the share of agriculture in overall GSDP as well as fluctuating trends in growth rates over the last few years. The agriculture sector experienced decrease in recent years, but continues to remain a priority sector for the state as 55.7 percent of the workforce draw their livelihood fully or partially from agriculture.

**(3) Agriculture sector**

Agriculture plays a pivotal role in the economy of Telangana, and improved performance of this sector is vital for inclusive growth. Telangana went in for the Green Revolution in rice cultivation in the 1970s. There have been significant changes in the structure and performance of the agrarian economy in the state in recent years. It will continue to be central to all strategies for planned socio-economic development of the state.

The state government has emphasized the need to achieve 6 percent growth and increased returns on investment to farmers through improved technology, effective extension reach, efficient input delivery, mechanization, marketing tie-ups, adequate credit and crop insurance. The agriculture sector constitutes the crop husbandry (agriculture and horticulture), livestock, forestry and fisheries sectors. Livestock sector contributed around one-third of the agriculture sector of GSDP during 2014/15. The growth of this sector has been stable compared to that of the crop sector over the last decade, although there has been a slowdown in its growth during the last two years. The growth of the livestock sector gains significance in light of the decline in the share of agriculture and allied activities in GSDP.

Table 5-26: Share of agriculture sector in agricultural GSDP at current prices (%)

Sector	2011	2014
Crop husbandry	57.7	51.8
Livestock	34.4	39.7
Forestry	5.5	5.0
Fisheries	2.4	3.5

Table 5-27: Details of net cropped area

Total geographical area	114.84 lakh ha
Gross cropped area	62.88 lakh ha
Net cropped area	49.61 lakh ha
Gross irrigated area	31.64 lakh ha
Net irrigated area	22.89 lakh ha
Average farm holding size	1.12 ha
Cropping intensity	1.27%
Irrigation intensity	1.38%

Source: *Telangana Socio Economic Outlook 2015*

## 1) Natural conditions

Telangana is a semi-arid area and has a predominantly hot and dry climate. Summer starts in March and peaks in May with average high temperatures around 42°C. The monsoon arrives in June and lasts until September. A dry, mild winter starts in late November and lasts until early February, with little humidity and average temperatures around 22–23°C.

The region is drained by two major rivers, with the Godavari River catchment area and the Krishna River catchment area. Telangana is also drained by several minor rivers such as the Bhima, Manjira and Musi. Annual rainfall is between 900mm and 1,500mm in northern Telangana, and 700mm and 900mm in

southern Telangana, from the south-west monsoon. Various soil types abound, and the soil is good for planting mango, oranges and flowers. About 45 percent of the forest area of the previous AP state is located in five districts of Telangana.

Table 5-28: Meteorological data

Category/District	Nizamabad	Adilabad	Rangareddy	Mahbubnagar
Major crop	Turmeric	Turmeric	Mango	Mango
Maximum temperature (°C/May)	44	41	40	41
Minimum temperature (°C/Dec).	25	15	26	29
Annual rainfall (mm/year)	900	1044.5	804.5	907.5
Altitude (m)	372	365	494	498
Hours of sunshine approx.	10	10	10	10

Source: Survey conducted by CHANGE

## 2) Land holding

As per the Agricultural Census 2010/11, there were 55.54 lakh holdings in the state, covering an area of 61.97 lakh hectares. The average size of holdings in the state is 1.11 hectares, which is highly uneconomical to operate. In the state 62.0 percent of the holdings are marginal (less than 1 hectare), and 23.9 percent are small (1 to 2 hectares). Thus marginal and small holdings constitute 85.9 percent of total agricultural holdings in the state, making agriculture a subsistence source of livelihood for the majority of the population.

More than 60 percent of holdings are marginal in Nizamabad, Karimnagar, Medak, Khammam and Warangal Districts. However, the area covered by semi-medium and small holdings is higher than marginal holdings. The average size of land holding is highest in Adilabad District (1.40 hectares), and lowest in Nizamabad District (0.92 hectares).

## 3) Crop productivity

District-wise yield of major crops in the state in 2013/14 is shown below. Productivity of turmeric is highest in Adilabad, while it is very low in Medak and Rangareddy. Nizamabad, a market hub for turmeric, has low productivity of turmeric. Productivity of chili is high in Khamman and Nizamabad.

Table 5-29: Yield of major crops (kg/ha)

District	Rice	Maize	Cotton	Chili	Turmeric
Adilabad	2,745	3,771	369	2,386	6,721

District	Rice	Maize	Cotton	Chili	Turmeric
Khamman	2,994	5,500	533	4,179	5,078
Karimnagar	3,591	5,464	491	2,710	6,303
Mahaboobnagar	2,839	4,749	352	3,232	5,078
Medak	3,653	3,720	416	800	2,869
Nalgonda	3,061	1,675	393	3,196	5,078
Nizamabad	4,004	5,352	338	3,941	4,178
Rangareddy	2,284	3,554	399	3,490	3,216
Warangal	3,141	4,984	472	3,249	4,521
Total average	3,297	4,685	423	3,544	5,078

Source: *Telangana Socio Economic Outlook 2015*

#### 4) Horticulture

Horticulture is one of the growth engines of the agriculture sector in Telangana. Being traditionally rich in horticultural resources and having favorable climatic conditions, it has been identified as one of the focus areas for development of the state. Horticulture is a significant contributor to Telangana GSDP. The total area under horticultural crops is 10.86 lakh hectares, with total production of 112.56 lakh tonnes. Major fruit crops in the state are mango, citrus, banana, guava and papaya, while vegetables like tomato, brinjal, bhindi (okra) and various varieties of gourd are predominant. Chili, turmeric and coriander are important spices. Coconut, cashew and oil palm are major plantation crops. The targeted area under horticulture for the next five-year Action Plan (2015-2020) is 14.48 lakh hectares, with estimated production of 152.31 lakh tonnes. In India, Telangana ranks third in cultivated area for fruit, and first in turmeric.

Table 5-30: Area and production of horticultural crops

Crop	Area (lakh ha)	Production (lakh tonnes)	Productivity (tonnes/ha)
Fruit	4.26	46.74	10.97
Vegetables	3.47	50.00	14.41
Flowers	0.08	0.43	5.38
Plantation crops	0.24	1.90	9.92
Spices	3.71	13.28	4.90
Medicinal plants	0.08	0.22	2.75
Total	10.86	122.56	

Table 5-31: National and international benchmarks for major horticultural crops

Crop	China			India			Telangana		
	Area lakh ha	Production lakh tonnes	Productivity tonnes/ha	Area lakh ha	Production lakh tonnes	Productivity tonnes/ha	Area lakh ha	Production lakh tonnes	Productivity tonnes/ha
Mango	13.00	50.00	3.8	25.00	180.00	7.2	2.0	18.04	9.0
Banana	4.00	105.00	26.3	7.75	265.00	34.2	0.18	6.58	36.6
Tomato	10.00	500.00	50.0	8.79	182.26	20.7	1.58	23.81	15.1
Onion	10.25	226.00	22.0	10.51	168.13	16.0	0.41	7.44	18.1

Source: Telangana Horticulture Department

#### (4) Government policy and programs

The state government's vision and mission to attain development of the agriculture sector is given below.

Vision: To enable every farmer to achieve sustainable and economic agricultural productivity.

Mission: ①Attain 6 percent growth and increased returns on investment for farmers through improved technology; ②Effective extension reach; ③Mechanization, marketing tie-ups, and adequate credit crop insurance.

##### 1) Organizational structure

The agriculture sector in Telangana is administered by the Department of Agriculture, and headed by the state Agriculture Minister. It was created mainly to provide agricultural extension services to farmers, and to transfer the latest technical knowledge to the farming community. The objectives of the department are to assess requirements for agricultural inputs well in advance, to regulate their production, and monitor timely supply of seeds, fertilizers and pesticides, implements, credit, etc., to farmers. The department also performs statutory functions under various acts and regulations (e.g. quality control) to ensure the supply of quality inputs, such as seeds, fertilizer and pesticides, to farmers.

Organizations under the department are depicted in the table below.

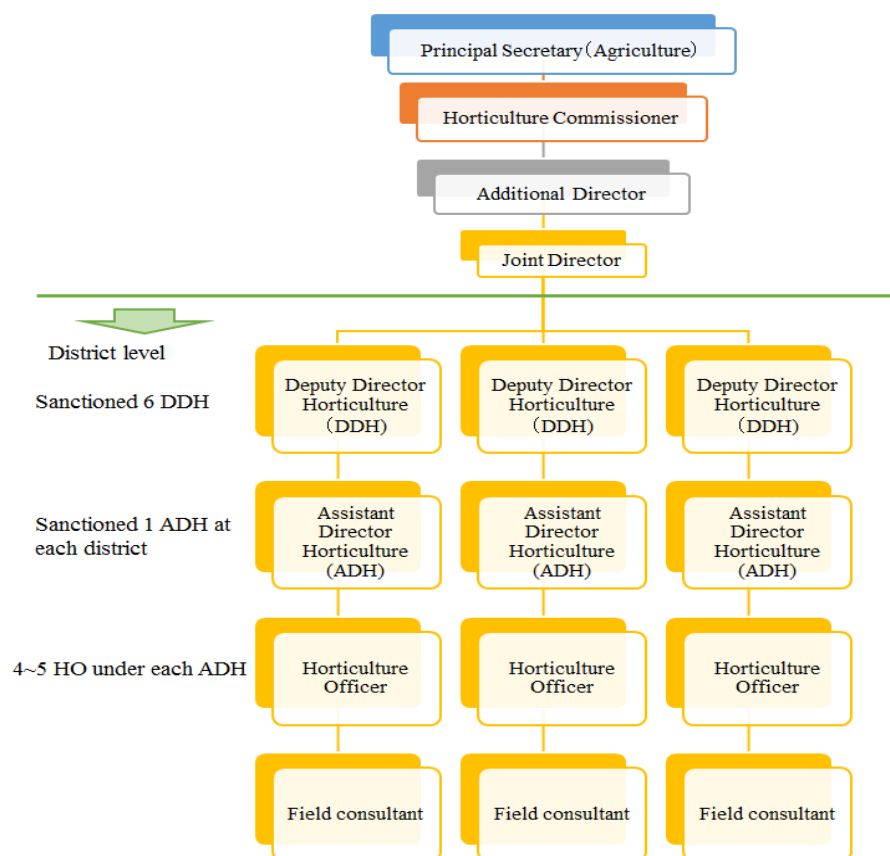
Table 5-32: Agricultural organizations

Agriculture Marketing and Cooperation Department - Principal Secretary of Agriculture	Commissioner of Agriculture	
	Commissioner for Cooperation and Registrar of Cooperative Service	
	Commissioner and Director of Agriculture Marketing	Telangana State Cooperative Marketing Federation

	Commissioner of Horticulture Department	Telangana Micro Irrigation Project
		Telangana Horticulture Mission
	Commissioner of Sericulture	
	State Agro-industries Development Corporation	State Warehouse Corporation

*Source: Study team*

The Department of Horticulture is implementing various schemes: the main thrust of core programs is to give a boost to the horticulture sector and to tap the available potential for development of the horticulture sector in the state. The department is under the control of the Principal Secretary of Agriculture, and led by the Horticulture Commissioner. One Additional Director and two Joint Director posts have been approved, but currently only one Joint Director is operational. At the district level two DDHs are assigned, and four more will be assigned soon. Under the DDH, eleven ADHs and seventy-two HOs have been posted. It is planned to recruit ten more ADHs and eighty HOs by the end of June 2015. One HO typically takes charge of six to ten mandals, with an area of 10,000-12,000 hectare. The role of the HO includes providing technical advice on cultivation of horticultural crops including flowers and spices, executing various schemes, conducting training and exposure trips for farmers, organizing meetings to advocate new technologies, and evaluating the need for assistance after natural disasters. A field consultant is assigned to support each HO in their daily tasks, but shortage of manpower to fulfill designated various tasks is a big challenge at field level.



Source: Study team

Figure 5-11: Telangana Horticulture Department organizational structure

## 2) Schemes to support horticulture sector

The total budget for promoting the horticulture sector during 2014/15 is INR643.14 crore. The major programs are Mission for Integrated Development of Horticulture (MIDH), Rashtriya Krishi Vikas Yojana (RKVY), National Mission for Oilseeds and Oil Palm Mission (NMOOP), Micro Irrigation Project (MIP) and State Plan Schemes. The budget figures for each scheme for 2014/15 are given below.

Table 5-33: Budget for horticulture schemes 2014/15 (crore INR)

State Plan Schemes	
Production of horticulture activities	186.39
Central Plan Scheme	
Mission for Integrated Development of Horticulture (MIDH)	75.58
Rashtriya Krishi Vikas Yojana (RKVY)	34.15
Budget of Agriculture Department	
On Farm Water Management (OFWM)	513.10
National Mission on Oilseed and Oil palm (NMOOP)	7.45

Source: Telangana Horticulture Department

- MIDH

As explained in 2.2.1, this is a centrally-sponsored scheme to promote holistic growth of the horticulture sector through area-based, regionally-differentiated strategies. In Telangana the scheme focuses on farm extension through distribution of pesticide and fertilizer, and developing a management database. It also covers rejuvenation of orchards, IPM, mechanization, and post-harvest management through establishing cold storage and ripening chambers (mainly for banana). A total of nineteen cold storage units, twelve ripening chambers, thirty-one pack houses and forty turmeric boiling units have been established to date.

- RKVY

RKVY is 100 percent supported by the central government, but with complete flexibility for the states to choose projects that are tailored to their conditions for generating growth in agriculture and allied sectors (see Annex I). Under this scheme the horticulture sector in Telangana supports purchasing hybrid seeds and plastic crates (50 percent of the cost is subsidized), provision of shade nets for vegetable nurseries, establishing pack houses through support of clustering, etc.

- State Plan

This scheme is also 100 percent supported by the state government for tailor-made state-specific programs. The government intends to take up construction of greenhouses in 7.9 hectares to promote cultivation of high value vegetables and flowers. Mulching tools were provided in 812 hectares. The government also encourages the establishment of poly houses in an area of 404 hectare. For 2014/15, the chief minister assured INR84.15 crore for naturally ventilated poly houses with 75 percent subsidy.

Table 5-34: State Plan Scheme 2014/15

Component	Physical	Budget (crore INR)
Promotion of horticultural activities		
1) Floriculture	465 ha	0.93
2) Poly sheets	11,672	1.49
3) Plastic crates	500,000	6.18
4) Publicity and administration		1.21
Beautification of public gardens		3.00
Chief Minister's Assurance		
1) Greenhouses	121 ha	84.15
2) Plant material under greenhouses	121 ha	40.85
3) Ankapur pre- and post-harvest interventions in turmeric		
a) Cement water storage structures	500	10.00
b) Drip irrigation	600 ha	3.78

Component	Physical	Budget (crore INR)
c) Tractor-mounted polishing drums	50	1.00
d) Improved model of turmeric harvester	25	0.63
e) Solar fencing	500 ha	1.13
Strengthening of horticulture farms/Human Resource Center	12	12.62
Plug-type nursery establishment	1	11.00
Turmeric portray seedlings/custom hiring centers/frontline demonstrations in Veppur, Nizamabad	3250 ha	3.01
Plug-type vegetable seedling supply	10,000 ha	5.00
Onion storage structure	200	0.42
	Total	186.39

Source: *Telangana Horticulture Department*

### 5.3.2 Mango

#### (1) Overview of crop production

According to the NHB, the total volume of mango produced in 2013/14 was 1,717,880 tonnes; this is the fourth largest in India, after AP, Uttar Pradesh (UP) and Karnataka. Varieties of mango grown by farmers in the region are predominantly table varieties such as Benisham, Himayat and Dasherī. Farmers do not grow the processing variety (Totapuri), as there is no processing firm nearby. About 95 per cent of farmers sell their mango to pre-harvesting contractors. Average productivity of mango in the state is 9.0 tonnes per hectare; this is higher than the national average of 7.2 tonnes per hectare, but much lower than 16 tonnes per hectare in UP.

#### (2) Current status and bottlenecks in the value chain<sup>75</sup>

##### 1) Overview of VC

Figure 5-12 depicts an overview of the mango value chain in Telangana. Most mangoes produced in Telangana is sold to pre-harvesting contractors. They are basically mango traders. They come to villages in November and December when mango flowers, check the condition of mango trees and conclude contracts with farmers to buy mango from entire orchards. After they conclude the contract, they are responsible for farm management, harvesting and sale of the mango. They hire laborers to do the work on the farms. Contractors generally sell mango to the APMC markets.

There are a small number of farmers who take their mango to a ripening chamber in Hyderabad, Cold Space, to improve the quality and look of their mango.

<sup>75</sup> The data and information in this section is based on the field survey of the Study Team.

Farm  
Management



**Department of Horticulture**

gives extension service and various subsidies to farmers

*Farmers manage farms before they conclude pre-harvest contracts. They grow only table varieties.*

*Pre-harvest contractors buy the whole orchard at the mango flowering time. After concluding contracts, they are responsible for farm management and harvesting, grading and sale of mangoes. They generally sell mangoes at APMC markets.*

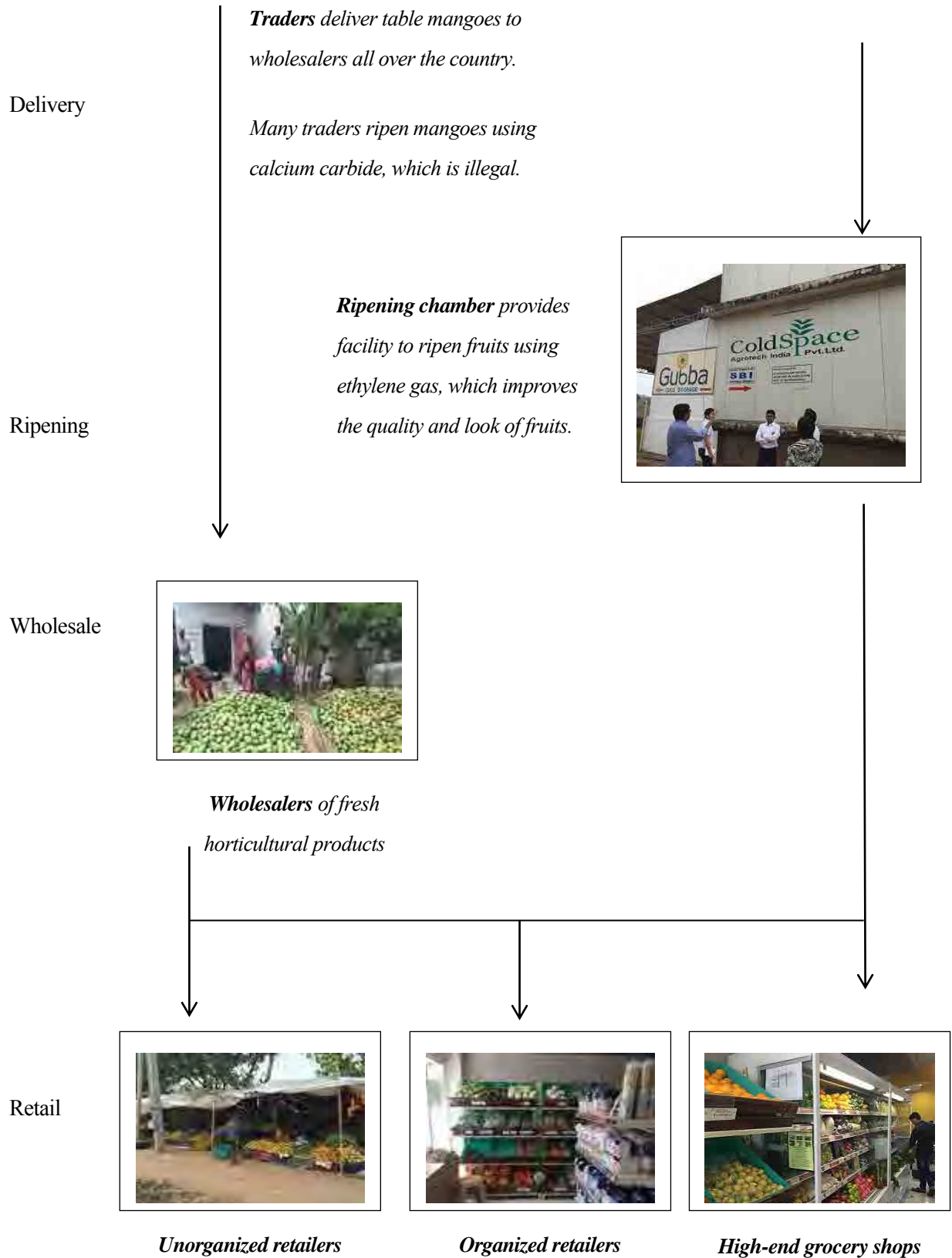
*A small number of farmers bring their mangoes to ripening chambers and then sell to city market or supermarkets*



Auction

*Auctions are managed by **commission agents**, and mangoes are sold to registered **traders** who come from all over the country*

**APMC MARKET**



Source and photos: Study team

Figure 5-12: Mango value chain in Telangana

Commission agents are responsible for managing the auction at APMC markets, and mango is sold to registered traders who transport the mango all over the country. They often do casual grading before shipping.

Traders deliver most of the fresh mango to large-scale wholesalers all over the country. Wholesalers often engage in grading and packing.

Fresh mango is then delivered to various types of retailers (organized and unorganized retailers, and small high-end grocery shops). It is usually difficult for organized retailers to form their own supply chain for mango, so most of them obtain it through the traditional supply chain.

There are a small number of farmers who take their mango to the ripening chamber in Hyderabad, Cold Store, to improve the quality and look of their mango. They then sell this mango to city markets or supermarkets by themselves. The price of mango increases by INR10-15 per kg after ripening.

A 50 per cent down payment is made at the time of contract with pre-harvesting agreements.

The price of mango changes through the value chain in the following way.

Table 5-35: Selling price of mango

Sales point	Prices
Selling price at wholesale market	Average price realization by farmer is INR14/kg.
Selling price to commission agent/village trader (commission agent only facilitates the auction process and gets commission)	Commission of 4% is allowed. Yet commission agents deduct 8-10 % out of farmers’ payment.
Selling price to pre-harvesting contractor	INR8-10/kg.
Selling price to primary processors	This variety does not go for processing.
Selling price to exporter	Average price is INR70/kg.
Selling price to retailer	Average price is INR34/kg.
Selling price to consumer	Average price is INR55/kg.

Source: Study team

**2) Stakeholder assessment**

**i) Farmers (landowners)**

**a) Role**

For most mango farmers in this region who sell their mango to pre-harvesting contractors, their main role is to manage farms during the off-contract period (after harvesting to flowering). Most farmers also grow rice and vegetables, and put more labor into growing these crops.

**b) Performance**

The sales value of mango to pre-harvesting contractors last year was INR50,000-100,000 per acre, depending on the condition of mango trees. One organic mango farmer used a ripening chamber and sold his

mango in the city market by himself. His turnover was INR25 per kg higher than when he sells it to a pre-harvesting contractor.

### **c) External environment**

There is a severe scarcity of agricultural labor as many young people do not want to work in agriculture. The fact that many laborers cannot work for agriculture after NREGA was implemented has aggravated the problem. This is one of the reasons why most farmers sell their mango to pre-harvesting contractors.

### **d) Resource (factors of production)**

Land: The majority of farmers are small farmers, but there are also a number of medium- and large-scale mango farmers.

Mango trees: Many trees are very old. Some of the trees are local varieties whose fruits are very small. Trees are subject to alternate bearings. Trees are very high, so farmers and laborers have to shake trees to harvest, which is likely to damage the fruit.

Equipment: Harvesting equipment and plastic cases are scarce.

Water: Lack of drip irrigation facilities is a problem.

Labor input: Mango farming does not require a lot of labor. Pre-harvest contractors manage farms between January and harvest. The main reason for farmers concluding pre-harvesting contracts is scarcity of labor.

### **e) Linkages**

There is one ripening chamber in Hyderabad, Cold Space, but many farmers feel that it is too far to utilize.

## **ii) Pre-harvesting contractors**

### **a) Role**

Pre-harvesting contractors are responsible for farm management, harvesting and sale of mango after concluding the contract. They hire laborers to do this work on the farms.

### **b) Resources (factors of production)**

Scale: The scale of each contract is relatively small. They deal with about ten farmers (200-300 tonnes of mango) per year.

Skills: As they are not professional farmers, their skills in farm and post-harvest management are poor.

Post-harvesting techniques: Many of them ripen mango using calcium carbide in order to make the mango look better; this is both harmful to health and illegal.

### **iii) Commission Agent (CA)**

#### **a) Role**

The role of CA is as intermediary between farmers (sellers) and traders (buyers) at the wholesale markets.

#### **b) Performance**

CAs get 4 per cent of sales value.

#### **c) Relevant government institution**

APMC manages the wholesale markets. Their responsibilities include registration of CAs and traders who can participate in trade at the market, and setting up management rules, commission rates and registration rates based on the APMC Act. They are also responsible for managing infrastructure at the wholesale markets.

### **iv) Traders**

#### **a) Role**

Traders buy agricultural products at the auction and transport them all over the country. They also do casual grading before shipping these products.

#### **b) Performance**

The profit margin of traders is estimated to be about 10 per cent.

#### **c) Relevant government institutions**

APMC manages the wholesale markets. Their responsibilities include registration of CAs and traders who can participate in trade at the market, and setting up management rules, commission rates and registration rates based on the APMC Act. They are also responsible for managing infrastructure at the wholesale markets.

### **v) Ripening chambers**

#### **a) Role**

Ripening chambers ripen fruits using ethylene gas, which improves the quality and look of the fruit.

#### **b) Resources (factors of production)**

Facilities: Cold Space plans to build hot water treatment and grading facilities, which will provide complete post-harvest service facilities for mango.

#### **c) Linkages**

Backward linkages: Two staffs at Cold Space provide training for farmers in marketing, quality management and packaging.

d) Relevant government institutions

Department of Horticulture: Cold Space gets an INR20 million subsidy from the Department of Horticulture for investing INR90 million to build the ripening chambers and cold storage facilities.

#### **vi) Wholesalers**

a) Role

Wholesalers are intermediaries and deliver on a large scale. They often engage in grading and packing. They also give finance to small traders.

b) Performance

The profit margin of wholesalers is estimated to be 10 per cent.

c) Resources (factors of production)

Large wholesalers often have large cash resources at hand, so they provide finance to small traders.

#### **vii) Unorganized retailers**

a) Role

Unorganized retailers are responsible for retailing products. Unorganized retailers include Kirana stores, fruit and vegetable or product-specific outlets and vendors, and stalls on the streets, which are all small-scale.

b) Performance

The profit margin of unorganized retailers is estimated to be 20 per cent.

c) Resource (factors of production)

Access to credit is limited for small retailers. They are typically dependent on private moneylenders for daily transactions, and have to pay high interest rates.

#### **viii) Organized retailers**

a) Role

Organized retailers are responsible for retailing products. The organized retailers include supermarkets, convenience stores, hypermarkets, and cash and carry shops.

b) Linkages

It is usually difficult for organized retailers to form their own supply chain of agricultural products as contract farming is not popular in India. Most organized retailers rely on fragmented traditional supply chains to obtain fresh mango.

### **ix) Small high-end food shops**

#### **a) Role**

Small high-end food shops are small grocery retailers in the big cities that sell high-end agricultural products including fresh fruit and vegetables to middle- or high-income households. The high-end market for fresh fruits in India is small, but is likely to grow.

### **3) Value Chain Assessment**

#### **a) Evaluation of the Value Chain**

Most mango farmers sell their mango to pre-harvesting contractors who are not professional farmers, but who then farm and handle the fruit. Farmers do little farm management of their land. It is difficult to see how farming and fruit production can be improved in this situation.

#### **c) Potential for upgrading**

There seems to be potential for value-addition to mango products at farmer- or village-level by utilizing ripening chambers and selling directly to high-end markets, as a small number of farmers have increased the selling price of mango a lot by doing this.

#### **d) Bottlenecks**

Bottlenecks and constraints for upgrading the value chain would include the following.

- Few linkages between farmers and ripening chambers
- Ripening by calcium carbide is extensively exercised by traders even though it is illegal
- There is little opportunity for farmers to get training in cultivation, harvest and post-harvest management
- Poor marketing capabilities of farmers.

#### **e) Need for assistance**

Assistance needed for the upgrade would include the following measures.

- Support to set up small-scale post-harvest facilities, to include ripening chambers, grading facilities, hot water treatment facilities, and storage in rural areas (or simply work with a firm like Cold Space), so that farmers can utilize these facilities to increase the value of their mango
- Provide training on post-harvest management (ripening, grading and packing) to farmers
- Promote introduction of certification standards for export markets
- Provide training on marketing to find markets or customers who will buy these products at higher prices, and to manage the relationship with customers (domestic and international).
- Build public awareness of the danger of ripening using calcium carbide.

### 5.3.3 Turmeric

#### (1) Overview of crop production

India accounts for 90 percent of world turmeric production, and 60 percent of world exports.<sup>76</sup> The total volume of turmeric produced in 2013/14 in Telangana was 461,990 tonnes; this is second largest in India, after Tamil Nadu.<sup>77</sup> Turmeric production in Telangana accounts for 20 percent of the total production in India. The average productivity of turmeric in the state is 5.1 tonnes per hectare; this is the same as the national average, but much lower than 17 tonnes per hectare in Gujarat and Haryana.

Turmeric is valued for its curcumin content and oleoresins. There is high demand from countries like the USA, Japan and Europe. Turmeric is a good source of natural yellow color, and is also used in the pharmaceutical industry as it has antiseptic/medicinal properties and is proven to have cancer preventing/curing properties.

Nizamabad turmeric market is the third largest market for turmeric. The major varieties grown in Nizamabad are Yerra Guntur/Duggirala (long duration) and Armoor (medium duration).

#### (2) Current status and bottlenecks in the value chain

##### 1) Overview of VC

Figure 5-13 gives an overview of the turmeric value chain in Nizamabad. The finger and bulb parts are separated after harvesting. Turmeric is boiled using a mobile boiling unit, dried for fifteen days in the sun, and polished using a mobile polishing unit at farm level. If farmers do not dry turmeric enough the turmeric is recognized as low quality in the market. If turmeric gets wet or damaged because of rain, the quality of turmeric deteriorates. Therefore drying turmeric is very important for farmers to get a better price.

Either farmers or transporters hired by farmers take dried turmeric to markets such as Nizamabad turmeric market or Snail turmeric market in Maharashtra State.

Once farmers have brought their turmeric to the market, CAs receive the products and sell them to buyers. Only licensed CAs and licensed buyers can sell and buy products in the market. Nizamabad turmeric market has installed an e-tender system, and CAs and buyers can bid through the computer system. Buyers can come any time between 10 a.m. and 3 p.m., decide their bidding price and tell the price at an office of the market. After 3 p.m. the highest prices are informed to CAs, and they tell farmers. Once a farmer accepts a price, the deal is concluded. The market receives 80,000-90,000 tonnes of dried turmeric annually.

Some farmers and traders use cold storage facilities to store dried turmeric until the market price rises. However many farmers tend to sell their products as soon as possible, as they borrow money from moneylenders or CAs and cannot wait for a better price.

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<sup>76</sup> FAOSTAT

<sup>77</sup> Horticulture Board - *Area and Production Estimates for Horticulture Crops for 2013-14*

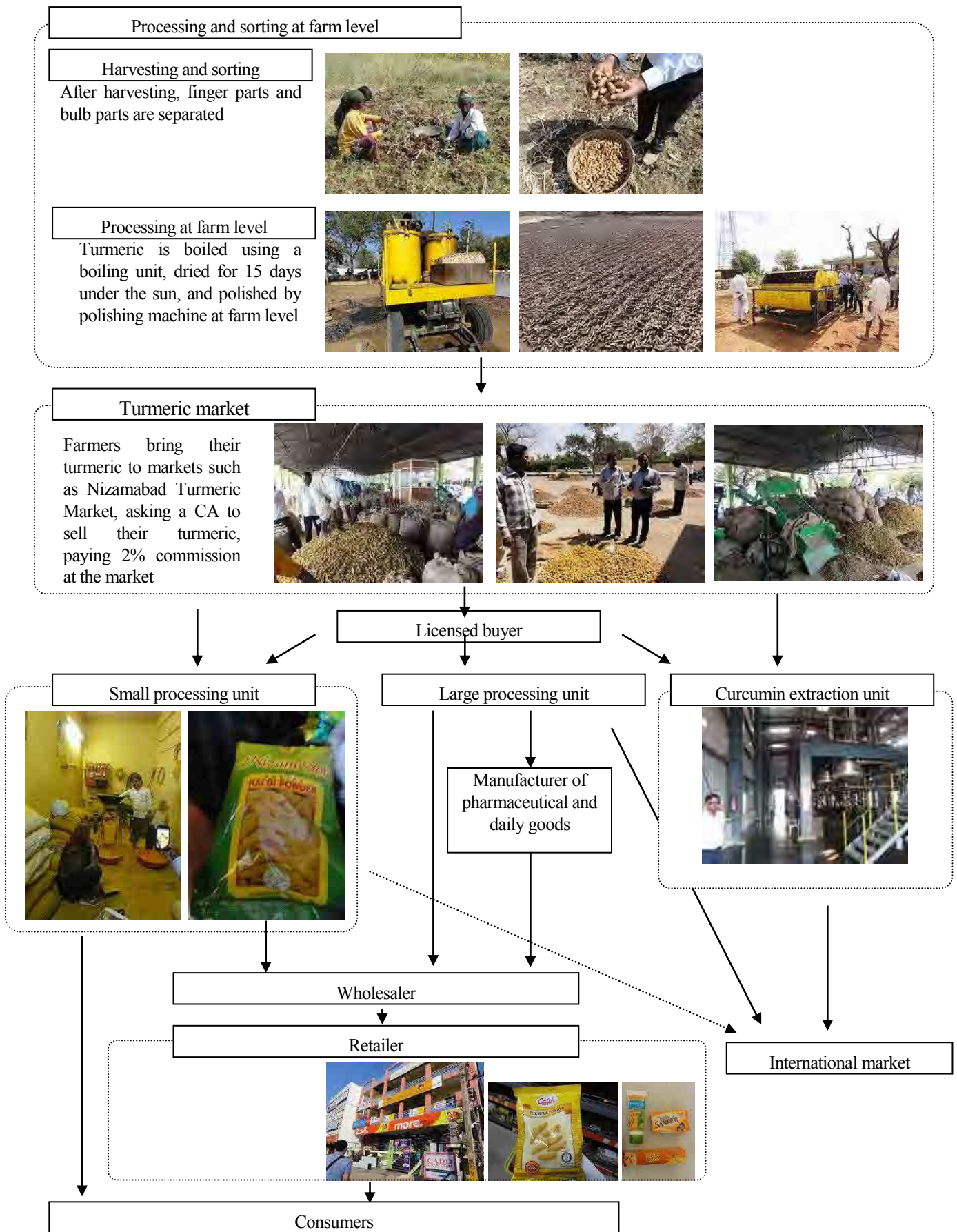


Figure 5-13: Outline of value chain of turmeric in Nizamabad

Source and photos: Study Team

Table 5-36 shows the price of turmeric at each stage of the value chain. As mentioned above, the selling price at the APMC market is determined through e-tender. The selling price at APMC market is determined based on its part (bulb or finger), variety, dryness, quality, size, market demand and other factors. As mentioned above, semi-dry turmeric is evaluated as lower quality. Buyers check the degree of dryness by hand, or throw it against the ground to hear the sound. As shown in the table below, the price of dried turmeric at the market ranged from INR45 per kg to INR64 per kg in 2013/14.

A small turmeric processing unit may charge INR10 per kg for grinding. The retail price at the supermarket is INR220-300 per kg. Once curcumin is extracted from dried turmeric, the price of curcumin can be INR5,500-6,300 per kg. Most of the curcumin is exported.

Table 5-36: Price of dried turmeric and turmeric products

Sales point	Price
Price farmers receive	Average price is INR57 /kg <ul style="list-style-type: none"> <li>1-2% of selling price at APMC market is deducted for commission of CA</li> </ul>
Price at APMC market	Average price is INR60/kg <ul style="list-style-type: none"> <li>INR45-64/kg in 2013/14</li> </ul>
CA	Commission agents receive 1-2% of selling price at APMC market as commission
Licensed buyer	Licensed buyers pay 1% of purchasing price to the APMC market
Price to primary processors	Average price is about INR70-80/kg <ul style="list-style-type: none"> <li>Primary processors may charge INR10/kg for grinding</li> </ul>
Price of turmeric powder to wholesalers	INR110/kg++
Price of turmeric powder to consumers at supermarket	INR220-300/kg
Curcumin price for export	Wholesale price of curcumin: INR5,500-6,300/kg <ul style="list-style-type: none"> <li>Depending on variety, but approximately 100 kg curcumin can be extracted from 2,500kg of dried turmeric. This means that value of 1 kg of dried turmeric becomes INR220-252/kg when extracting curcumin</li> </ul>

Source: Study team

## 2) Stakeholder assessment

Various players, including farmers, APMC market, CAs, cold storage facilities, wholesalers, processors and retailers, are involved in the value chain of turmeric. The current situation of each stakeholder is summarized below.

**a) Farmers**

Farmers harvest the turmeric, sort it into bulb and finger, boil, dry, polish, and take the dried turmeric to the APMC market. First farmers cut the part above ground, and wait for a while before harvesting. Once the part above ground withers, farmers harvest the turmeric manually. Harvesting turmeric is labor-intensive. Some farmers said that they need 150 man-days per hectare (60 man-days per acre) for harvesting. Some portion of the harvested turmeric is kept for seed purposes for the following season.

Once turmeric is harvested, it is steamed using a mobile boiling unit. The boiling units installed in Nizamabad District were developed and manufactured in India. Individual farmers purchase the boiling units for INR450,000 with a subsidy from the government. The HO said that the state government provided a subsidy for about 500 boiling units in Nizamabad District. However there are not enough boiling units. The upper limit of the subsidy is less than half the total investment, or INR150,000. Turmeric keeps a higher curcumin content if it is steamed using a boiling machine rather than being boiled by the traditional boiling method. Therefore using a boiling unit brings better value addition for dried turmeric. Since the boiling unit is mobile and can be transported by tractor, the owner of a boiling unit can easily lease the unit to other farmers who do not have a unit.

After boiling, turmeric is sundried for 15 days, mainly on the ground. It is recommended to dry on a concrete platform or at least on polythene sheets. However because of lack of space and/or money, most farmers dry their turmeric on the ground without poly sheets. If it rains during sun drying, turmeric gets wet and damaged. After boiling, drying and polishing, the weight of turmeric decreases to 20-25 percent of the original weight.



*Photos: Study Team*

## b) APMC market

The APMC market in Nizamabad is the third largest turmeric market in India, after Erode market in Tamil Nadu and Sangli market in Maharashtra. Although the market is not only for turmeric, the main crop traded at the market is turmeric.

Only licensed CAs and licensed buyers can buy and sell turmeric at this market. CAs receive 1-2 percent of the sales amount from farmers, while licensed buyers pay 1 percent of the purchase amount to the market. The market introduced an e-tender system for turmeric trade, through which CAs and buyers can bid electronically. Buyers can come any time between 10 a.m. and 3 p.m., decide their bidding price, and tell this price to the market office. After 3 p.m., CAs inform farmers of the highest price. Once farmers accept a price, the deal is concluded. The market receives about 80,000-90,000 tonnes of dried turmeric annually. Table 5-37 shows the arrival volume and market fees collected at the market.

Table 5-37: Arrival volume and market fees collected at Nizamabad turmeric market

	2011/12	2012/13	2013/14	2014/15 (up to Nov 2014)
Arrivals in quintals (hundred kg)	781,524	944,319	836,877	628,385
Market fee collected (INR)	636.94	637.41	598.36	381.14

Source: Agricultural Market Committee, Nizamabad



Photos: Study Team

### **c) CAs**

CAs receive turmeric at the market, and show samples with a slip generated through the e-tender system. Once the dealing time is over at 3 p.m., CAs check the results of bidding at the market office. CAs contact farmers and tell the price offered by buyers. Once farmers accept a price, the deal is concluded. Seventy-two CAs are licensed in the market. Sometimes CAs provide loans to farmers. It is said that this binds farmers to selling their products to the CA.

### **d) Licensed buyers**

About fifty buyers are licensed at the market.

### **e) Cold storage**

Some cold storage facilities have been established in Nizamabad. These store turmeric, red jowar (sorghum), white jowar, soybean, maize, etc. The temperature is kept around 10-12°C. The main customers are farmers and traders of crops. The Cold Storage Association in the area determines the storage fee. The current monthly storage fee for turmeric in Nizamabad is INR7-12/bag, depending on the size of bag. Farmers or traders can borrow up to 70 percent of the market price from the bank by collateralizing stored crops.

By using cold storage, farmers can sell their products at a higher price. However most farmers borrow from moneylenders or CAs, and have to sell their products as quickly as possible.



*Photos: Study Team*

### **f) Wholesalers or traders**

There is no large-scale turmeric processing unit in Nizamabad. Most of the dried turmeric sold at the market goes to other states for processing.

### **g) Small-scale processors for turmeric powder**

As mentioned above, there is no large-scale turmeric processing unit in Nizamabad. The number of small-scale processing units is also limited.

Dried turmeric is processed into powder by a primitive processing facility at a small-scale processing unit. The wholesale price of turmeric powder is about INR110 per kg, and the processing facility sells about 150kg/day.



Photos: Study Team

### 3) VC assessment

#### a) Current status and evaluation of value chain

The turmeric industry in Telangana has a lot of potential, although there are some limitations. The strength of the turmeric industry in Telangana can be summarized as: i) large production volume, ii) high potential of export to other states and the international market, iii) establishment of the third largest turmeric market in India, and iv) high profitability to farmers. However because of the limited number of processing units, value addition to turmeric in Telangana is limited. Each point is explained below.

##### i) Large production volume

Telangana is one of the biggest turmeric-producing states, with 461,990 tonnes produced in 2013/14. Three of the districts in Telangana - Nizamabad, Warangal, and Karimnagar - produce about 207,439 tonnes, equivalent to 17 percent of total turmeric production in India.

##### ii) High potential of export to other states and international market

Since turmeric is essential for Indian cooking, there is a high demand for turmeric throughout India. In addition, as the largest turmeric-producing country in the world, there is good potential for export to the international market, reflecting the international diversification of eating habits as well as increasing demand for curcumin for medical purposes.

##### iii) Establishment of the third largest turmeric market in India

The APMC market in Nizamabad is the third largest turmeric market in India, after Erode market in Tamil Nadu and Sangli market in Maharashtra. Last year the market introduced an e-tender system for efficient and transparent trade. It is said that the market price of turmeric at Nizamabad market is lower than Sangli market because of its semi-dry form. By improving the drying method, farmers could sell their products at a better price.

##### iv) High profitability to farmers

According to farmers, turmeric production is more profitable than paddy production. Farmers can produce and sell INR40,000 of paddy after four months cultivation, while they can produce and sell INR200,000 worth of turmeric after nine months cultivation. Although the price of turmeric fluctuates and the input cost is relatively high, farmers are more interested in turmeric than paddy production.

v) Small number of processing units for turmeric powder and curcumin extraction

Although turmeric in Telangana has a lot of potential, there are few processing units for turmeric in Telangana. Therefore value addition to turmeric is limited. Turmeric is transported to other states for further processing, such as AP, Maharashtra and Kerala.

## **b) Potential for upgrading VC**

i) High value addition for turmeric

There is potential to increase value addition for turmeric in two ways: improve quality at farm level, and increase value addition to processed turmeric.

Thanks to the modern boiling unit (steam boiling unit) that has been introduced recently, the quality of turmeric has improved. Although the government provides a subsidy to farmers to purchase a modern boiling unit, farmers claim that there are not enough boiling units. The majority of farmers still dry their turmeric on the ground at the farm without poly sheets, and the quality of turmeric deteriorates. Value addition to turmeric can be gained through improving post-harvest management at farm level.

Turmeric is processed to powder for cooking. Curcumin is extracted from dry turmeric for pharmaceutical purposes. Turmeric has a lot of potential for value addition by processing.

ii) Better income to farmers

According to farmers in Nizamabad, the cultivation of turmeric is more profitable than production of paddy. If farmers can improve turmeric quality and productivity, farmers can increase their income. In addition, if farmers can keep their dried turmeric in cold storage, they can sell their products at a higher price.

iii) Increase export to international markets

According to the Spice Board, the demand for turmeric as well as curcumin will increase internationally. Although there are few processors of turmeric in Telangana, there is potential to increase exports of turmeric and curcumin to the international market.

## **c) Bottlenecks to be overcome**

i) Improper drying practices and insufficient number of modern boiling units

As mentioned above, there are not enough modern boiling units. Regarding proper drying practices, although the government encourages farmers to install concrete dry platforms or at least use poly sheets, the majority of farmers do not do this.

ii) Limited level and number of processing units near producing area

There are only a few turmeric grinding units in Telangana, although it is one of largest turmeric-producing states in India.

iii) Limited direct linkages between farmers and processors/exporters

Since there is no major turmeric processor in Telangana, there is no direct linkage between farmers and processors/exporters. As indicated in the chili sector in Guntur, direct linkages between farmers and processors/exporters can bring benefits to both farmers and processors/exporters. By linking farmers and processors/exporters, farmers can understand market needs, improve turmeric quality and increase their income.

**(3) Need for assistance**

Need for assistance can be categorized into assistance to farmers and assistance to processors/exporters.

a) For farmers

- Provide training to improve farming practices
- Provide training to improve post-harvest practices, such as drying and grading
- Help farmers to introduce physical facilities such as dry platforms and harvesters
- Help farmers to link to processors/exporters

b) For processors/exporters

- Help processors/exporters to link to potential farmers or farmer groups
- Provide training for supply chain management, including traceability
- Support marketing, linking with importers.

## 5.4 Priority state 3: Odisha<sup>78</sup>

### 5.4.1 Overview of the state

#### (1) General overview<sup>79</sup>

Odisha is located in the east of India, having 485 km of coastline along the Bay of Bengal from Balasore to Ganjam. It is the ninth largest state by area, and eleventh largest by population. Oriya (officially spelled *Odia*) is the official language, spoken by 81.8 percent of the population. Scheduled Castes (SC) and Scheduled Tribes (ST) form 17.1 percent and 22.8 percent of the state population, together constituting 38.66 percent of the state population. In 2007 the proportion of people living below the poverty line was 42.9 percent, nearly double the all India average of 24.2 percent.<sup>80</sup> The religious composition of Odisha is 94.3 percent Hindu, 2.0 percent Muslim and 2.4 percent Christian.

Table: 5-38: Overview of Odisha

Governor	S.C. Jamir
Chief minister	Shri Naveen Patnaik
Area	155,707km <sup>2</sup>
Number of districts	30
Number of blocks/tahasils	314/317
Population	41,974,218 (2011 census)
Rural population	34,970,562
Urban population	7,003,656
Total Scheduled Tribe population	9,590,756 (22.8%)
Total Scheduled Caste population	7,188,463 (17.1%)
Literacy rate	72.9%

Source: Odisha state portal

#### (2) Sector overview

In the past decade, the sectoral composition of Odisha's economy has witnessed a dramatic change, as seen in Figure 5-14. It is clearly becoming less agricultural, more industrial and more service-oriented over time. In 2012/13 agriculture represented only 16.44 percent of Odisha's GSDP. Despite continuous reduction of the sector in GSDP, it continues to be vital for the state. It still provides employment and sustenance, directly or indirectly, to more than 60 percent of the population. In this sense the agriculture sector is still a mainstay of Odisha's economy. In contrast to the general image of a backward state, the

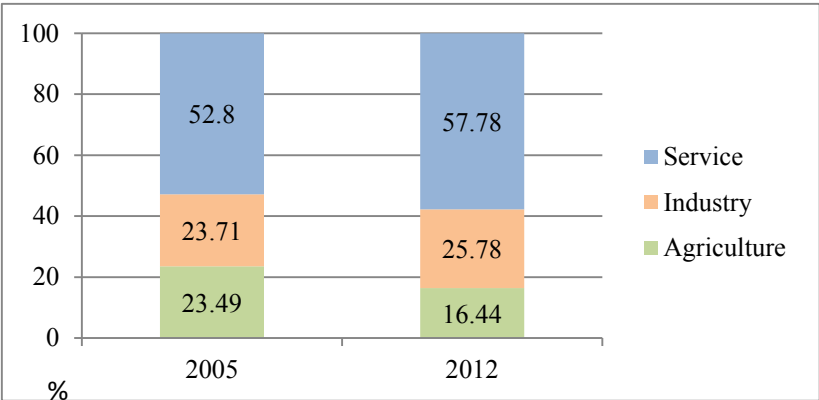
<sup>78</sup> As indicated in 5.1 (4), description of this section is not as detailed as that of AP since the additional survey (third field survey) was conducted only in AP.

<sup>79</sup> This section is written based on information collected from Odisha state portal (<http://www.odisha.gov.in/portal/default.asp>) and *Odisha Economic Survey 2012-2013*.

<sup>80</sup> Sonalde B. Desai et.al. (2010), *Human Development in India: Challenges for a Society in Transition*, Oxford University Press

industrial sector in Odisha is prominent as it has large-scale mineral-based industries. Odisha has 10 percent of the total steel production capacity in India, and 25 percent of its total iron ore reserves. Odisha has received large investments in the industrial sector in recent years. Odisha also occupies first place in the country in aluminum, both in terms of production capacity and actual output.

The service sector dominates the state’s economy: its share in real GSDP has been about 58 percent in recent years. Community, social and personal services contribute 13.55 percent; trade, hotels and restaurants 13.61 percent; financial and insurance services 11.67 percent; construction 9.07 percent; and other services 9.56 percent.



Source: Odisha Economic Survey 2012/13

Figure 5-14: Comparison of sectoral composition of GSDP at current prices (2012/13)

**(3) Agriculture sector**

Of its total geographical area of 15.5 million hectares, the state has about 6.4 million hectares of cultivable area (41.16 percent). Paddy is the major crop and comprises more than 75 percent of the cropped area in the state, followed by pulses with 11 percent. Oilseed accounts for nearly 6 percent of the cropped area, and other cash crops including horticultural crops have only 3 percent of acreage. Agriculture in Odisha is characterized by low productivity on account of various factors, including problematic soil (acidic, saline and waterlogged), lack of assured irrigation, low seed replacement rate, low level of fertilizer consumption (63 kg per hectare against the national average of 140 kg per hectare) and low level of mechanization.

**1) Natural conditions**

The climate of the state is tropical, characterized by high temperature, high humidity, medium to high rainfall and mild winters. The normal annual rainfall is 1,451.2 mm, of which the south-west monsoon contributes about 80 percent. The state’s agriculture sector suffers from frequent natural disasters like cyclones, droughts and flash floods. The table below presents basic meteorological data for selected districts in the state.

Table 5-39: Meteorological data

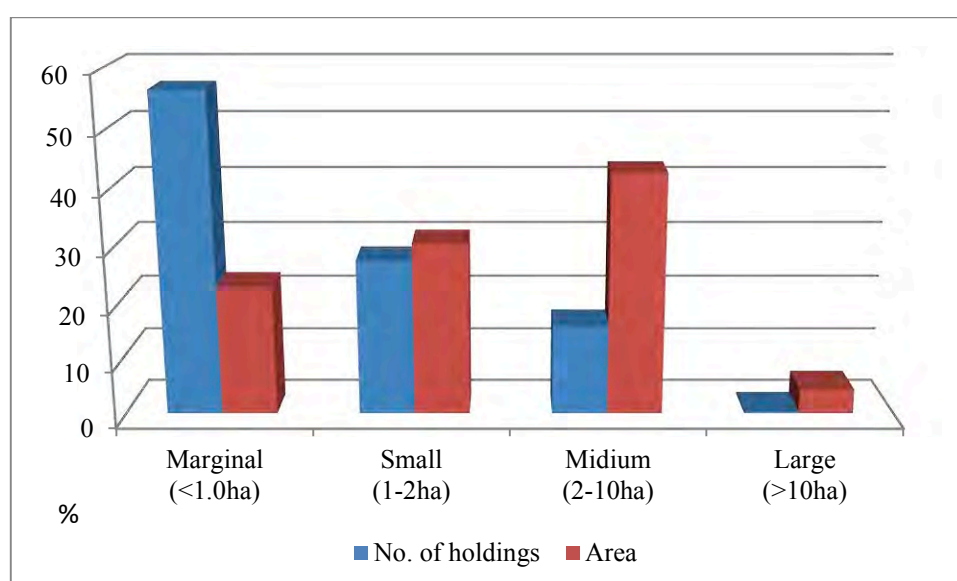
Category/district	Koraput	Rayagada	Malkangiri	Kandhamal
Major crop	Mango, cashew nuts, ginger	Mango	Cashew nut	Ginger, turmeric
Maximum temperature (°C/month) May	35	49	45	35
Minimum temperature (°C/month) Dec.	4	29.5	26.1	5
Annual rainfall (mm/year)	1,567.2	1,455.74	1,257.8	1,726.5
Altitude (m)	969	300	150	553
Hours of sunshine	<8	10	10	8

Source: Survey conducted by CHANGE

Three-quarters of the state is covered in mountain ranges, and the highest mountain peak in the state is Deomali (1,672 m). Rivers with broad valleys in the state have brought some fertile soil, which is suitable for agriculture.

## 2) Land holdings

The average farm size in Orissa is very small, and has reduced even further in recent years. During 2000/01 there were 4.06 million operational holdings in the state, of which marginal and small holdings accounted for 83.8 percent, medium 15.9 percent and large less than 1 percent. The average size of holding is only 1.25 hectares. The size of operational holdings, and widespread poverty, pose a major problem for agricultural growth of the state.



Source: Directorate of Agriculture

Figure 5-15: Land holding pattern in Odisha

### 3) Horticulture

The varied agro-climatic conditions in Odisha are suitable for a variety of fruit, vegetable, spice and flower crops. The comparatively cooler hilly tracts of highland districts give ample opportunity for off-season vegetable production - Odisha is a major horticultural state in India. In Odisha 1.37 million hectares are taken up by horticulture, producing 12.2 million tonnes of crops. Fruit crops were grown on 329,400 hectares in 2013/14, out of which mango was the largest (197,500 hectares). Coconut, banana, pineapple and citrus are other important fruit crops. Vegetables like okra, brinjal, tomato, cabbage and cauliflower are grown all over the state. Odisha ranks fourth in production of vegetables at national level. Ginger and turmeric are the most important spices grown in the state; tribal people use indigenous methods of crop production to grow these using organic manure, without using any chemical fertilizer. Major districts for spice production are Khandamal and Koraput Districts.

Table 5-40: Area and production of horticulture crops in Odisha in 2013/14

Crop		Odisha	% share in India
Fruit	Area (ha)	329,400	4.7
	Production (tonnes)	2,210,400	2.7
Vegetables	Area (ha)	688,100	7.4
	Production (tonnes)	9,464,000	5.8
Spices	Area (ha)	123,900	4
	Production (tonnes)	181,500	3.2

Source: Indian Horticulture Database 2013

The average crop productivity in Odisha is lower than that of other parts of India. For fruits, the average productivity in the state is only 7.9 tonnes per hectare, against the national average of 11.7 tonnes per hectare. Similarly for vegetables, the average productivity in the state is 12.9 tonnes per hectare, against the national average of 17.3 tonnes per hectare. These issues around production and productivity are further intensified by problems with infrastructure and market linkages. There is a complete lack of processing/handling facilities and the supply chain is inefficient and fragmented, leading to low prices for the farmers. Poor returns affect the farmers' incentive to produce efficiently, which in turn impacts the overall production and productivity of fruit and vegetables in the region.

### 4) Market system

The agricultural marketing system in Odisha is distinctly different from states that are more progressive in agricultural marketing in India. Markets are supervised by Regulated Market Committees (RMCs) instead of

the APMCs in other states; these were established in 1956 to regulate the buying and selling of agricultural products. There are 65 RMCs and 428 market yards in the state. A peculiar situation prevails in Odisha in terms of ownership and management of markets. Different markets come under different ownership and management – they may be owned and managed by RMCs, local bodies like municipalities, gram panchayats, or private persons and associations. In most urban and semi-urban localities they are either managed by municipal organizations or leased out to private persons. The fate of farmers in these markets is simply left to the discretion of the lessee. In some markets trading started as assembling and forwarding points for vegetables or fruit grown in the locality, with traders coming from other parts of the state or other states; this gradually developed into private markets managed by associations of traders. Traders dominate the markets in terms of pricing of products, and local traders act as agents for buyers from out of the district or state; farmers have to depend on these local agents for sale of their produce. The prevailing marketing system is grossly inefficient; farmers do not have access to market for sale of their produce, and resort either to selling their produce to local traders at low prices or do not cultivate vegetables. Consumers tend to have to pay higher prices for the commodities they purchase.

#### **(4) Government policy and programs**

##### **1) Government strategy**

In order to facilitate development of agro-industry as a whole, tackling multiple problems in agricultural production, post-harvest management and marketing, the state government has established the following major policies, which comprise various financial support programs. These aim to benefit the small and marginal farmers,. Although these policies are intended to complement each other in order to achieve the objectives, there is still little effective coordination between implementing agencies of respective policies.

##### **➤ State Agriculture Policy 2013**

The main objectives of the policy are:

- To bring in a shift from the present level of subsistence agriculture to profitable commercial agriculture, and to improve productivity of important crops by enhancing seed replacement, availability of quality planting materials, INM, IPM, water management, farm mechanization and technology transfer.
- To focus on horticultural crops including dryland horticulture; to encourage organic farming.
- To facilitate increased long-term investment in the agricultural sector (on-farm as well as off-farm) by the private sector, public sector, and private and public partnership (PPP), particularly for post-harvest management, marketing, agro processing and value addition.
- To encourage contract farming, to facilitate appropriate market linkages for agricultural produce for which the state has competitive advantage, and to improve marketing facilities and access to market information.

- To create appropriate institutions/facilities to undertake regulatory, enforcement and quality assurance activities to match emergent needs.
- To redefine the roles and responsibilities of the agricultural extension machinery by appropriately restructuring the field extension set-up.

➤ **State Food Processing Policy 2013**

Currently only about 0.7 percent of the total produce is processed in Odisha. This policy aims to develop food processing as a vibrant industry, creating employment opportunities for people engaged in primary production activities and increasing farm return by value addition to farm produce. The policy aims to increase food processing in the state by 10 percent by 2017, and 25 percent by 2025. The main objectives are:

- To increase the flow of investment across the supply chain from farm to market
- To increase value addition and reduce wastage, thereby increasing the income of farmers
- To maximize direct and indirect employment opportunities
- To create the necessary supply chains, including transportation, warehousing and cold storage in rural areas
- To promote the establishment of enterprises in Food Parks/Mega Food Parks

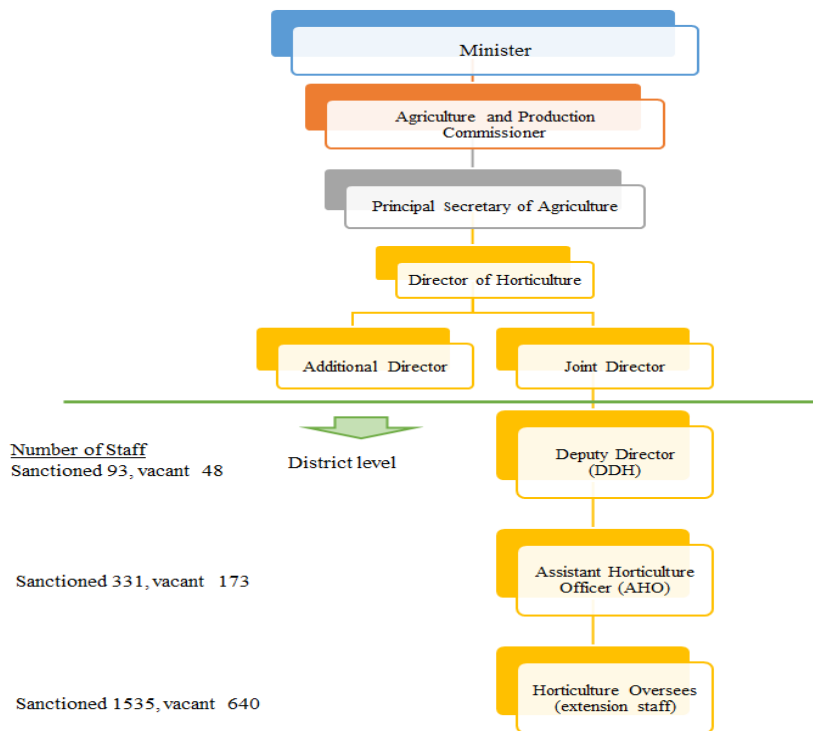
**2) Organizational structure**

The table below summarizes the departments working on sectors relating to AVCs in Odisha; these are under the control of the respective ministers and principal secretaries.

Table 5-41: Organizations relating to AVCs

	Department	Directorates/agency
Production	Agriculture Department	Agriculture and food production
		Horticulture
		Soil conservation
		Watershed development
		Agricultural Promotion and Investment Corporation of Odisha (APICOL)
Marketing	Co-operation	Agricultural Marketing
		Odisha State Agricultural Marketing Board (OSAMB)
Food Processing	Industry	
	Micro, small and medium enterprises (MSME)	

The Agriculture Department takes overall responsibility for improving production of crops in the state. While the Directorate of Agriculture and Production supervises activities for major grain crops, the Directorate of Horticulture oversees the production of horticultural crops. The organizational structure of the Directorate of Horticulture is depicted in the figure below. Nearly half the approved posts at field level for subsidy and extension work are currently not filled.



Source: Study team

Figure 5-16: Odisha Directorate of Horticulture organizational structure

The Directorate of Agriculture Marketing aims to implement government schemes and strengthen marketing infrastructure to help farmers market their produce. Currently eleven staff are in position at head office, and eleven are in the field. While the directorate’s focus is more on market research, grading and standardization, OSAMB controls and supervises RMCs.

The Department of MSME is the leading organization for promoting the food processing sector. It is the nodal agency for Odisha Food Processing Policy 2013, and the Directorate of Industries and Regional Industries Centers/District Industries Centers are implementing agencies for the policy. APICOL was formed under the Department of Agriculture for commercial agriculture, to motivate farmers and entrepreneurs for agribusiness. The organization provides capital investment subsidies for a wide range of agribusiness practices such as commercial floriculture, fertilizer production, food processing, cold storage and soil testing laboratories.

### 3) Schemes to support the horticulture sector

There are a number of schemes being implemented to support the horticulture sector in Odisha. The main interventions by the national and state governments are listed below.

- MIDH

As in other states, this centrally-sponsored scheme to promote holistic growth is the core program for the horticulture sector. In Odisha, the scheme focuses on expanding the area of fruit crops (mango and banana) through tree plantation, and post-harvest management through providing facilities such as pack houses, pre-cooling units and reefer vans. It also puts emphasis on tree rejuvenation and mechanization. The total budget for 2013-14 was INR989.377 million, and about 25 percent was spent on post-harvest management and marketing.

- RKVY

This centrally-sponsored scheme is generally project-based; Odisha received INR80 million for establishing Denkanal Fruit and Vegetable Pack House, out of the total INR1 billion received for horticultural activities for 2013/14.

- NREGS

This is a flagship scheme of the government for employment generation, guaranteeing a rural household 100 days of waged employment in a year. The unique feature of the scheme in Odisha is to utilize the fund for crop plantation (mainly mango and banana); in many other states the scheme cannot be applied to farming work. The state allocation of the fund for this purpose is about INR1 billion.

- State Plan

To provide additional support for the central schemes, the state plan allocated INR0.16 billion for plantation activities, and INR0.23 billion for post-harvest management for 2013/14.

Table 5-42: Horticulture Scheme 2013/14

Component	Physical target	Budget (million INR)
Establishment of nursery	22	12.95
Fruit tree plantation (including maintenance)	11,300 ha	66.95
Cashew plantation	9,339 ha	36.00
Coconut plantation	2,083 ha	50.00
Flower cultivation	765 ha	24.83
Spice (turmeric) cultivation	3,000 ha	37.5
Pack house	500	75.00
Cooling/preservation unit	121	43.30
Reefer van	12	11.52

Component	Physical target	Budget (million INR)
Minimal processing unit	2	1.92
Onion storage	171	8.55
Zero energy cool chamber	1,050	2.1
Power operated machine	2,000	74.2
Rejuvenation of old fruit tree	600 ha	9.00
Creation of farm pond	3,000	180.00
Training and exposure visit		13.55
Micro irrigation	11,711	130.55

Source: Odisha Directorate of Horticulture

## 5.4.2 Mango

### (1) Overview of crop production

According to the NHB, the total volume of mango produced in 2013/14 is 751,022 tonnes; this is sixth largest in India after AP, Uttar Pradesh, Karnataka, Bihar and Gujarat. The main varieties produced in Odisha are Amrapalli, Beganpalli, Dasherri, Mallika and Neelam, which are favorable for the northern market. Mango is very important strategic crop in Odisha, as it accounts for about 31 per cent of total fruit production. However, the average productivity of mango in the state is much lower than that of other parts of India: 3.8 tonnes per hectare, against the national average of 7.2 tonnes per hectare and 16 tonnes per hectare in UP.

### (2) Current status and bottlenecks of value chain<sup>81</sup>

#### 1) Overview of VC

Figure 5-17 depicts an overview of the mango value chain in Odisha. There are a few nursery farmers in Rayagada District. Most of the seedlings they produce are sold to the Horticulture Department, who then subsidize provision of seedlings to farmers.

Large-scale farmers hire agricultural laborers for farm management and harvesting. The agricultural laborers in this area are typically female members of landless or small landholding households. Many of the male members of these households go to other states such as Karnataka for work. Medium and small mango farmers in this area tend to manage their farms and harvest by themselves, not hiring agricultural laborers.

Many farmers in the region have started planting mango in the last four or five years, prompted by the Department of Horticulture. Most mangoes produced in these areas are table varieties such as Amrapali and Dasherri. Most farmers sell their mango without any post-harvest treatment such as hot water treatment,

<sup>81</sup> The data and information in this section are based on the field survey of the Study team.

ripening or grading. A small number of farmers ripen mango by a traditional method using straw, in order to increase the selling price.

Traders generally go to the farm gate to buy mango. Some traders also ripen mango by a traditional method using straw. One trader in Rayagada owns a simple small post-harvest facility, but this is the only post-harvest management facility in this area. Traders mainly deliver mango to the wholesale markets at Bhubaneswar or Raipur, Chhattisgarh. They do not sell to the markets in AP, as farmers in AP supply enough mangoes. Small amounts of mango are delivered to local weekly markets.

As described in 5.4.1 there are no APMCs in Odisha; sixty-six RMCs are responsible for managing markets. However most of the markets only trade rice and cereals, and there is no organized management system for horticulture markets in Odisha.

Traders deliver fresh mango from the wholesale markets to the large-scale wholesalers. Wholesalers often engage in grading and packing.

Fresh mango is then delivered to various types of retailer (organized and unorganized retailers, and small high-end grocery shops). It is usually difficult for organized retailers to form their own supply chain of mango, so most of them obtain it through the traditional supply chain.

Seedling  
Production



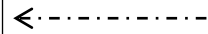
*Nursery Farmers  
produce mango  
seedlings*



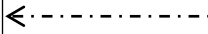
Mango  
Production



*Agricultural laborers are hired for  
farm management and harvesting*



*Department of Horticulture*

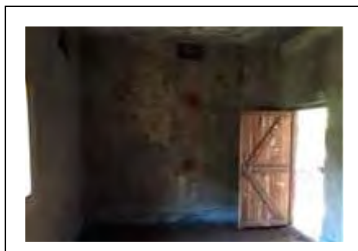


Horticulture officer gives extension service  
and various subsidies to farmers

*Farmers grow table varieties*



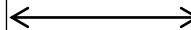
Post-  
harvest  
manage  
ment



*Some traders ripen mangoes.*



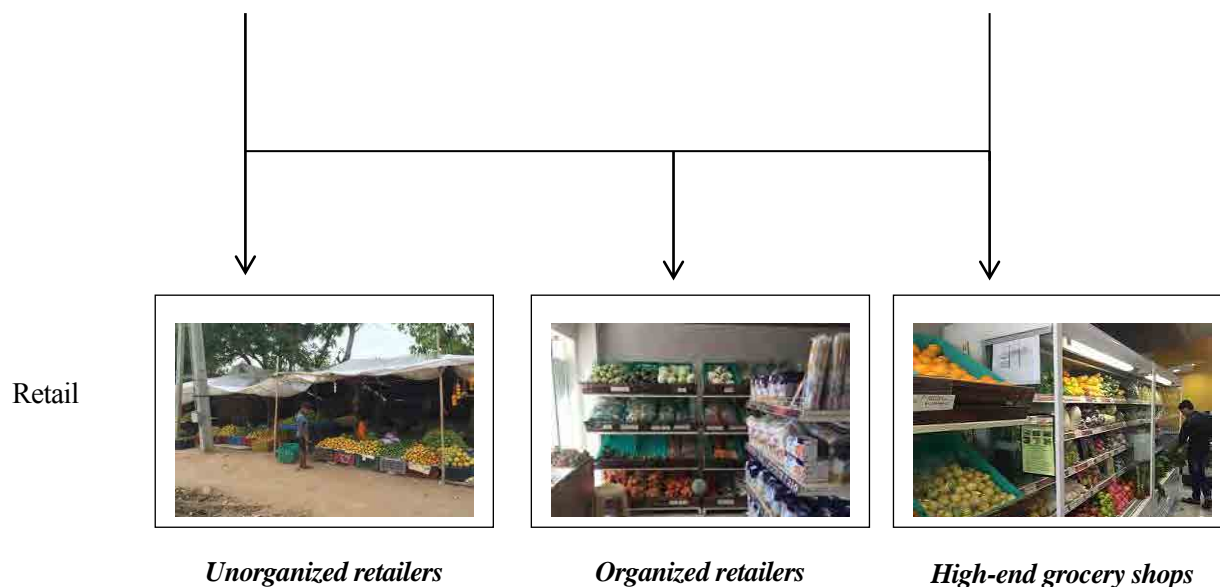
*Traders deliver mango to markets.*



Trades at wholesale markets

Trades at weekly markets

*RMCs manage markets*



Source and photos: Study team

Figure 5-17: Mango value chain in Odisha

The price of mango changes through the value chain as follows.

Table 5-43: Selling price of mango

Sales point	Price
Farm gate price	For table varieties such as Amrapali and Dasherri, INR15-17/kg
Selling price at wholesale market	Average of INR20/kg
Selling price to retailer	Average of INR30/kg
Selling price to consumer	Average of INR40/kg

Source: Study team

## 2) Stakeholder assessment

### i) Agricultural laborers

#### a) Role

Agricultural laborers provide labor to mango farmers for farm management and harvesting.

#### b) Performance:

Payment is INR100-130/day. Farmers provide lunch and tea.

### ii) Nursery farms

#### a) Role

Nursery farms grow mango seedlings.

b) Performance:

The price of a seedling is INR1.2.

**iii) Farmers**

a) Role

Farmers cultivate mango, including farm management and harvesting.

b) Performance:

The yield of mango is 5-8 tonnes per acre, which is relatively low. The farm gate price for table varieties such as Amrapali and Dasherri was INR15-17 per kg in 2014

c) External environment

Precipitation is low, but there is enough rainfall to grow mango trees. There are relatively abundant female laborers available for agriculture in rural areas.

d) Resource (factors of production)

Land: Landholding of the farmers is relatively large. Most of the land is hilly and is not irrigated; mango can still be grown there.

Water: Farmers generally depend on rainfall and do not provide water to mango trees, even though there are rivers and canals in these areas.

Other inputs:

Some farmers use fertilizer and pesticide, but some farmers do not use these at all.

Skills: Farm management skills are generally poor, especially in pest and disease management, as many farmers have only recently started cultivating mango trees.

Post-harvest management: Some farmers ripen mango by a traditional method using straw. Farmers do not do other post-harvest management, such as hot water treatment and grading.

e) Linkages

Traders generally come to the farm gate to obtain fresh mango. Some of them provide farmers with crates for transporting the mango. There is one non-governmental organization (NGO), HARPAL, which supports 442 farmers in plantation and cultivation of mango in Kashipure area of Rayagada District. The secretary of HARPAL is a large mango trader, and he supports the marketing of mango by farmers.

f) Relevant government institutions

Department of Horticulture: HOs play the role of extension officer, giving farmers guidance on activities such as pest control and new cultivation methods. There are not enough staff to cover the whole

region - in Rayagana District, for example, there are only four Assistant HOs and thirty-two Field Staff (who support HOs)

The department is providing a significant amount of subsidy to farmers for mango plantation, in an attempt to increase mango production. For example, a subsidy of Rs.16,500 per hectare is given in Rayagana for new plantation of mango trees. Similar amounts of subsidy are given for new plantation of cashew nut, litchi and lime.

Other subsidies are also available, including the following:

- 70 per cent subsidy (50 per cent from federal, 20 per cent from state government) for tractor, power tiller and cold storage
- Vegetable seedlings to farmers: Rs.20,000 per hectare
- 50 per cent subsidy for building compost unit (total cost INR100,000)
- 50 per cent subsidy for building pack house (total cost of INR500,000).

#### **iv) Traders**

##### a) Role

Traders go to the farm gate to buy fresh mango and transport it to wholesale markets or local weekly markets. Some traders ripen mango in a traditional way using straw. A small number of traders ripen mango using ethylene.

##### b) Performance

The profit margin of traders is estimated to be about 10 per cent.

##### c) Resources

One trader in Rayagada owns a simple small post-harvest facility for hot water treatment, ripening and grading. He sells some good quality mango to an exporter at higher prices than the wholesale market. Apart from this, post-harvest management facilities are not available in this area.

##### d) Linkages

Traders deliver most of the mango to wholesale markets in Bhubaneswar or Raipur, Chhattisgarh. Small amounts of mango are delivered to local weekly markets.

##### e) Relevant government institutions

RMCs are responsible for managing wholesale markets and weekly markets. However, there is virtually no systematic management by RMCs on trade in the markets. Traders who trade at these markets have to pay INR1,100 annual registration fee and 1 per cent of trade value as market fee to RMCs.

## **v) Wholesalers**

### a) Role

Wholesalers are wholesale intermediaries and deliver on a large scale. They often engage in grading and packing. They also provide finance to small traders.

### b) Performance

The profit margin of wholesalers is estimated to be about 10 per cent.

### c) Resource (factors of production)

Large wholesalers often have large cash resources at hand, so they provide finance to small traders.

## **vi) Unorganized retailers**

### a) Role

Unorganized retailers are responsible for retailing products. Unorganized retailers include Kirana stores, fruit and vegetable or product-specific outlets and vendors, and stalls on the streets, which are all small-scale.

### b) Performance

The profit margin of unorganized retailers is estimated to be about 20 per cent.

### c) Resource (factors of production)

Access to credit is limited for small retailers. They are typically dependent on private moneylenders for daily transactions, and have to pay high interest rates.

## **vii) Organized retailers**

### a) Role

Organized retailers are responsible for retailing products. Organized retailers include supermarkets, convenience stores, hypermarkets, and cash and carry shops.

### b) Linkages

It is usually difficult for organized retailers to form their own supply chain of agricultural products, as contract farming is not popular in India. Most organized retailers rely on fragmented traditional supply chains to procure fresh mango.

## **vi) Small high-end food shops**

### a) Role

Small high-end food shops are small grocery retailers in the big cities that sell high-end agricultural products including fresh fruit and vegetables to middle- or high-income households. The high-end market for fresh fruit in India is small, but is likely to grow.

### **3) Value Chain Assessment**

#### **i) Evaluation of the Value Chain**

The agro-climatic conditions are suitable for mango plantation, and the necessary resources for mango cultivation such as land, water and labor are available in the region. The major varieties planted, such as Amrapali and Daseri, have good market potential. There is an NGO in Rayagana that supports farmers in plantation and basic cultivation skills. These factors indicate the significant potential for mango production; the volume produced is likely to increase considerably even though many farmers have only started producing mango recently.

Farm management skills are quite poor, especially in pest and disease management and post-harvest management; this is part of the reason for the low yield in mango production. Availability of post-management facilities is limited. Some farmers grow mango organically, which gives potential for creating linkages to high-end markets.

#### **ii) Potential for upgrading**

First, there is potential to increase the amount of mango produced by increasing the plantation area and productivity. The increase in productivity requires improvement in farm management. Secondly, value-addition to table variety production can be increased through improving the harvest and post-harvest management, and promoting market linkages to high-end markets (domestic and international), including organic markets.

#### **iii) Bottlenecks**

Bottlenecks and constraints for the upgrade in the value chain will include the following:

- Poor post-harvest management
- Weak marketing capabilities of farmers
- Poor water, pest and disease management
- Poor access to major markets in some areas.

#### **iv) Need for assistance**

The assistance needed for the upgrade would include the following measures.

- Set up small-scale post-harvest facilities for hot-water treatment, ripening and grading mango in rural areas.
- Provide training on farming practice (including water, pest and disease management) and harvesting to produce quality products.
- Support farmers to obtain organic and/or Fairtrade certificates.

- Provide training on post-harvest management (hot water treatment, ripening and grading) to farmers (individuals or groups)
- Provide training on marketing to find markets or customers who buy these products at higher prices, and to manage relationships with customers (domestic and international).
- Develop capacity of relevant government departments.

### **5.4.3 Cashew Nut**

#### **(1) Overview of crop production**

According to the NHB, total production of cashew was 85,710 tonnes in Odisha in 2013/14, the third highest in the country. Cashew trees have been traditionally grown in the area for protection of eradication and soil conservation, hence the trees are old with lower productivity. The sector provides an opportunity for women in rural areas to earn extra income.

#### **(2) Current status and bottlenecks in the value chain<sup>82</sup>**

##### **1) Overview of VC**

Koraput District is the major cashew nut production area in Odisha. Its altitude and warm climate are favorable for cashew nut cultivation. Most farmers in Koraput are small farmers, with 2 acres of land or less. Many farmers use their land for cultivation of mango and cashew. Small- and medium-scale farmers generally manage farms and harvest by themselves, without hiring laborers. Farmers do primary drying of cashew nuts immediately after harvesting, putting the nuts on the ground for one day.

Local traders generally go to the farm gate to purchase cashew nuts, and take them to processing firms. Processing firms then process the raw cashew nuts to edible form, by steaming and roasting nuts. There are sixty-five cashew nut processing firms in Koraput, and they use a significant amount of female labor for processing activities. Processed cashew nuts are sold to various markets in India. The processors in Koraput have not been able to sell their product on the international market.

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<sup>82</sup> The data and information in this section are based on the field survey of the Study Team.

Cashew nuts production



**Department of Horticulture**

Horticulture officer gives extension service and various subsidies to farmers

Primary drying of nuts

*Farmers grow cashew nuts and conduct primary drying of nuts*

*Traders deliver cashew nuts to processing firms*

Processing



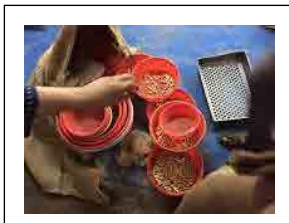
Steaming



De-shelling



Drying (roasting)



Peeling



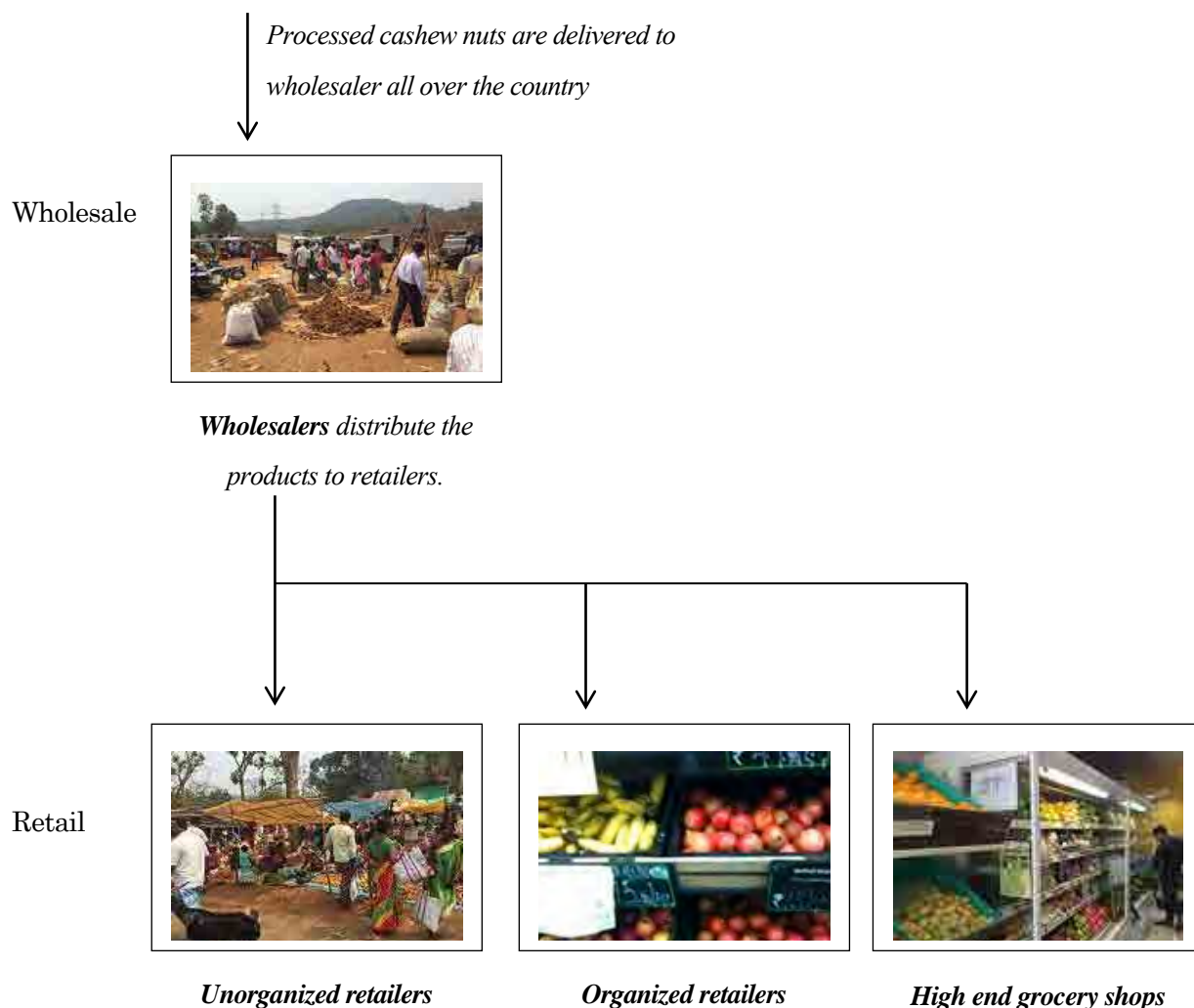
Grading



Packing

*Processors process cashew nuts*

*Large parts of the cashew nuts are exported*



*Source and photos: Study team*

Figure 5-18: Cashew nut value chain in Odisha

The price of cashew changes through the value chain in the following way.

Table 5-44: Selling price of cashew nut

Sales point	Price
Farm gate price	INR60-90/kg
Selling price to processors	INR80-100/kg
Selling price to exporter	INR180-700/kg depending on the grade (there are more than 30 grades)
Selling price to retailer	INR250-750/kg depending on the grade
Selling price to consumer	INR300-800/kg depending on the grade

*Source: Study team*

## 2) Stakeholder assessment

### i) Farmers

#### a) Role

The role of farmers is management of farms and post-harvest management of cashew nut trees. Farmers also conduct primary drying of cashew nut at their farms.

#### b) Performance:

Yield of cashew nuts is between 0.3-0.7 tonnes per acre; this is far less than Vietnam, which is about 2 tonnes per acre - Vietnam cashew nut farmers are the most productive in the world. The farm gate price of cashew nut is INR60-90 per kg.

#### c) Resource (factors of production)

Land: The average area of cashew nut plantation per farmer is about 2 acres in Koraput, which is slightly larger than the national average.

Water: Farmers do not provide water to cashew nut trees, but depend on rainfall.

Cashew nut trees: Most cashew nut trees are quite old (40-50 years old), and these old trees are mainly local varieties. These are the main reasons for the low yield. The Horticulture Department is trying to promote replacement of old trees by new plantation of hybrid variety cashew nut trees.

Labor input: Cashew nut farming does not require a lot of labor, so small- and medium-scale farmers generally manage the farm and harvest by themselves, without hiring laborers.

Other inputs: Even though no fertilizer or chemicals are given to cashew nut trees, there is no major pest or disease problem.

Skills for post-harvest handling: Primary drying of cashew nut can be done easily, as it does not require special skills or equipment.

#### d) Linkages

There are many local traders who go to the farm gate to buy cashew nut then deliver it to processing firms.

#### e) Relevant government institutions

Department of Horticulture: HOs play the role of extension officer, giving farmers guidance on activities such as pest control and new cultivation methods. There are not enough staff to cover the whole region.

In an attempt to increase cashew production the department is providing a significant subsidy to farmers for cashew plantation. For example, in Koraput a subsidy of INR28,000 per hectare is given for plantation of new cashew nut trees. Similar amounts of subsidy are given for new plantation of mango, litchi and lime.

The following subsidies are also available.

- 70 per cent subsidy (50 per cent from federal, 20 per cent from state government) for tractor, power tiller, and cold storage

- Vegetable seedling to farmers: INR20,000 per hectare
- 50 per cent subsidy for building compost unit (total cost INR100,000)
- 50 per cent subsidy for building pack house (total cost INR500,000)

## ii) Traders

### a) Role

Traders purchase cashew nut at the farm gate and deliver it to processing firms in Koraput District.

### b) Performance

The profit margin of traders is estimated to be 10 per cent.

## iii) Processing firms

### a) Role

Processing firms process cashew nut into edible form by steaming and drying it.

### b) Performance

The largest of the sixty-five cashew processing firms in Koraput, SS Foods, has installed capacity to process 80 tonnes of cashew nut every day, whereas the average size firm has capacity for 4-5 tonnes/day.

The selling price of the highest grade (whole large size) is INR700 per kg; that of average size is INR400-500 per kg. In April the price may be up to 10 per cent lower than the highest period. The price of crushed nuts is INR180 per kg.

### c) Resource (factors of production)

Raw material: About 50 per cent of raw cashew nut is obtained from Odisha and AP. The other 50 per cent is imported from African countries such as Nigeria, Guinea-Bissau and Tanzania. The price of raw cashew nut grown in Africa is 30-40 per cent lower than Indian-grown raw cashew nut.

Labor input: Processing firms are heavily dependent on cheap labor for processing cashew nut in their plants. An average size plant needs about 150 workers for processing. Workers are predominantly female members of rural households in the region.

Facilities: Larger firms own peeling and grading machines, but most processors depend on labor for this work. No metal detector is introduced. SS Foods has equipment to extract oil from cashew nut shells. The oil is for industrial use and exported to East Asia.

Skills and technology: The labor productivity of processing plants in Koraput is claimed to be 50 per cent lower than in Kerala and Karnataka. Processors claim it is difficult to provide training to workers, as they tend to move to another firm after training.

There is room to improve the processing technology through improving hygiene, introducing continuous processing, and increasing the shelf life of the product. No standards or certification have been introduced.

Finance: Processors claim that financing is a major problem in their business, as interest rates are around 20 per cent, and banks require collateral of 200-400 per cent of the loan. They usually do not rely on government subsidies, as they take a lot of time and effort to get.

d) Linkages

Backward linkages: There is no organized procurement system for raw cashew nut. Each factory has to deal with forty to fifty traders.

Forward linkages: All cashews are sold in the domestic market. They would like to sell in the international market, but have not been successful so far. The Cashew Promotion Council in Kerala helps processors in Kerala and Bangalore with export promotion, but processors in Odisha do not have a close relationship with the Council as it is too far away.

Horizontal linkages: There is no association for processors in Odisha. However, as processors know each other it is relatively easy for them to form an association if the situation requires them to do so.

e) Relevant government institutions

The Department of Food Processing Industry is nominally responsible for supporting processors, yet the processors in this region do not have a close relationship with the department.

#### **iv) Wholesalers**

a) Role

Wholesalers are wholesale intermediaries and deliver on a large scale. They often engage in grading and packing. They also provide finance to small traders.

b) Performance

The profit margin of wholesalers is estimated to be about 10 per cent.

c) Resource (factors of production)

Large wholesalers often have large cash resources at hand, so they provide finance to small traders.

#### **v) Unorganized retailers**

a) Role

Unorganized retailers are responsible for retailing products. Unorganized retailers include Kirana stores, fruit and vegetable or product-specific outlets and vendors, and stalls on the streets, which are all small-scale.

b) Performance

The profit margin of unorganized retailers is estimated to be 20 per cent.

c) Resource (factors of production)

Access to credit is limited for small retailers. They are typically dependent on private moneylenders for daily transactions, and have to pay high interest rates.

## **vi) Organized retailers**

### **a) Role**

Organized retailers are responsible for retailing products. The organized retailers include supermarkets, convenience stores, hypermarkets, and cash and carry shops.

## **vii) Small high-end food shops**

### **a) Role**

Small high-end food shops are small grocery retailers in the big cities that sell high-end agricultural products including fresh fruit and vegetables to middle- or high-income households. The high-end market for fresh fruit and vegetables in India is small, but is likely to grow.

## **3) Value Chain Assessment**

### **i) Evaluation of the Value Chain**

The conglomeration of cashew nut processors and large number of cashew nut farms in Korapur give great potential for the development of cashew-related sectors in this region. The cashew nut processors maintain competitiveness in the domestic market, partly supported by cheap female labor which is locally supplied. Yet the quality of production and labor productivity of the processors is relatively poor compared to leading processors in Kerala and Karnataka. They have not yet succeeded in exporting their product. The low yield of cashew nut trees is a major bottleneck for cashew nut production.

### **ii) Potential for upgrading**

There is potential to upgrade cashew nut processing by promoting the export of cashew nut; this requires improving the processing qualities and marketing capabilities of processors. The fact that cashew nut trees are grown organically provides an opportunity to appeal to international markets.

### **iii) Bottlenecks**

Bottlenecks and constraints to upgrading the value chain include the following:

- Low yield of cashew nut production appears to be the biggest bottleneck
- Unorganized procurement system
- Weak linkage to international markets
- Low labor productivity of processing units
- Lack of safety and quality control system at factories

### **iv) Need for assistance**

Assistance needed for the upgrade would include the following measures.

- Promote plantation of new cashew nut trees to replace old cashew nut trees
- Provide training on farming practice and harvesting to produce quality products
- Promote linkages between farmers and international markets by helping farmers to get organic and/or Fairtrade certificates
- Provide training to workers at cashew processing plants to increase productivity
- Support cashew processors to improve their ability to find markets or customers in export markets and to manage their relationship with customers
- Support processors and workers to adopt the necessary practices to sell in international markets, including obtaining international standards and certification
- Develop capacity of relevant government departments.

#### **5.4.4 Ginger**

##### **(1) Overview of crop production**

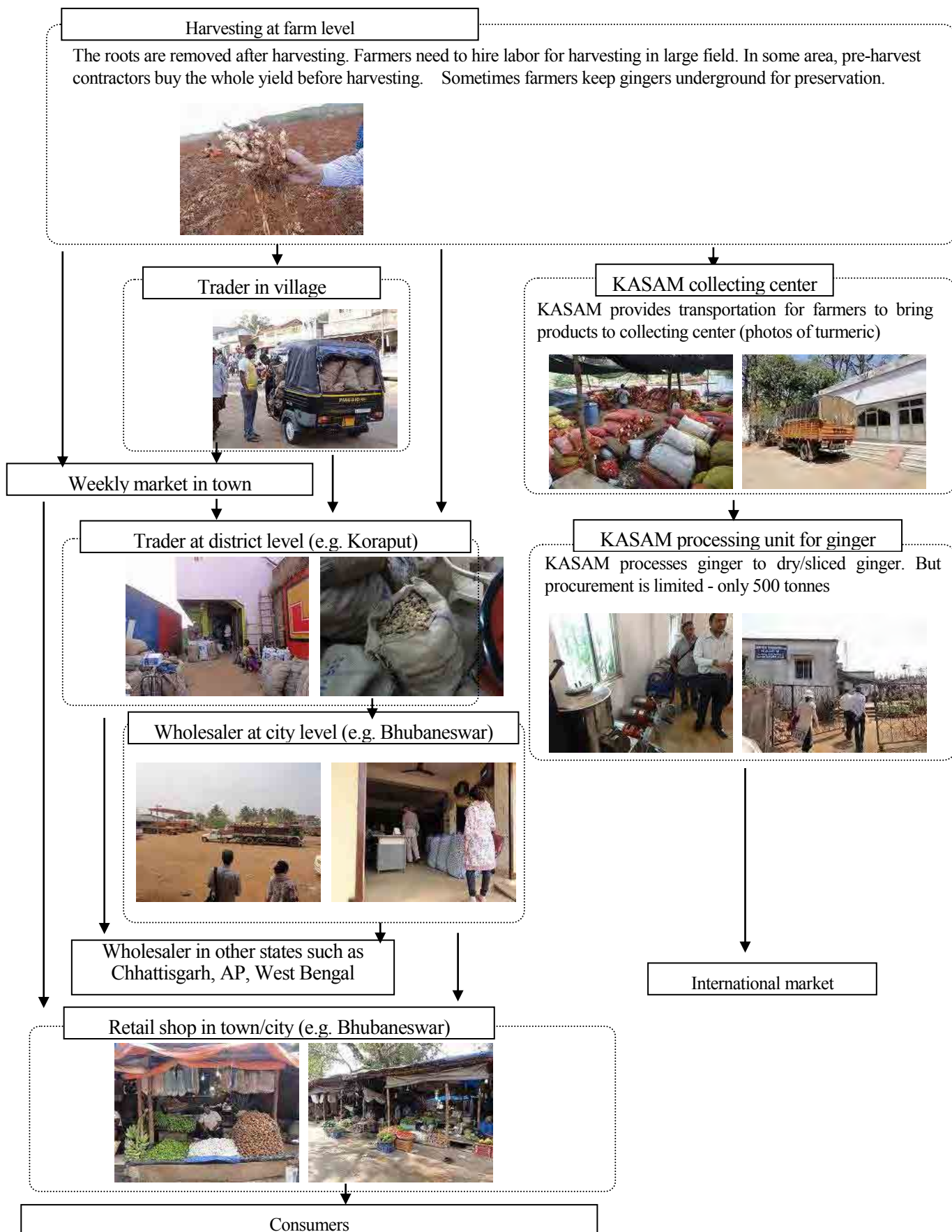
According to the Spice Board, in 2011/12 Odisha state was the largest ginger- producing state in India with 134,980 tonnes, of production followed by Karnataka state and Gujarat state in 2011/12. The average productivity of ginger in the state is 2.2 tonnes per hectare, which is less than half the national average of 4.9 tonnes per hectare, and much lower than 16 tonnes per hectare in Gujarat.

##### **(2) Current status and bottlenecks in the value chain**

###### **1) Overview of VC**

Figure 5-19 depicts an overview of the value chain for ginger in Odisha. Farmers either harvest ginger by themselves or hire labor for harvest. Pre-harvest contractors buy the whole yield before harvesting in some areas near AP. The roots are removed from the rhizome after harvesting. Traditionally ginger is preserved underground. Ginger does not require any specific post-harvest treatment before it is marketed.

Unlike chili in Guntur and turmeric in Nizamabad, there is no established market for ginger in Odisha. Farmers take their produce to traders in villages, or traders from villages come to farmers to purchase ginger. A certain amount of ginger is sold at weekly market in towns. Traders at district level purchase ginger at weekly markets, or purchase it directly from farmers or traders in villages. Traders at district level sell ginger to wholesalers in cities in Odisha or other neighboring states such as Chhattisgarh, AP or West Bengal. Consumers purchase ginger at retail shops in towns/cities or at weekly markets.



Source and photos: Study Team

Figure 5-19: Outline of value chain of ginger in Koraput/Khandamal District

In Kandhamal District there is an organization called Kandhamal Apex Spices Association for Marketing (KASAM), which is promoted by the Government of Odisha. KASAM mainly purchases turmeric, but also purchase a small amount of ginger.

Table 5-45 shows the price of ginger at each stage of the value chain. There is no APMC market in Odisha. Ginger is mainly transported from trader to trader until it reaches the capital city, Bhubaneswar, and other states. According to interviews with traders and wholesalers, they seem to take around INR5 per kg in commission. The price at the farm gate, and to traders in towns, wholesalers and retailers are respectively about INR40 per kg, INR45 per kg, INR50 per kg, and INR50-60 per kg. KASAM exports a small amount of dry ginger, and the export price is INR350 per kg.

Table 5-45: Price of ginger

Stage	Price
Price which farmers receive	Average price is INR40 /kg
Price to traders in towns	Average price is INR45/kg
Price to wholesalers	INR50/kg
Retail price to consumers	INR50-60/kg
Dry ginger for export (KASAM)	INR350/kg

Source: Study team

## 2) Stakeholder assessment

Various players, including farmers, traders, wholesalers and retailers, are involved in the value chain of ginger. Since ginger is transported fresh and is rarely processed, processors are not involved in the value chain in Odisha. The current situation of each stakeholder is summarized below.

### i) Farmers

Farmers plant seed rhizome that they harvested the previous season. When the ginger has grown to a certain amount a few months later, farmers dig the seed ginger and sell it to traders or at market. In some areas near AP, pre-harvest contractors come and buy the whole yield before the harvest season. However the majority of farmers harvest ginger themselves, or hire labor for harvesting paying INR150 per day for male labor and INR100 per day for female labor. The harvesting season in this area is January to April. Once ginger has been harvested, roots are removed from the rhizomes. No other special treatment or processing is required before marketing.

The ADH in Koraput District said that the most profitable agricultural crop in this area is banana (tissue culture), followed by ginger and potato in the monsoon season. According to a farmer, the amount produced depends on the amount of seed used for cultivation. If 800 kg of seed ginger is used per acre,

production would be six to eight times the original seed: 4,800 to 6,400 kg per acre. Farmers sell their ginger to traders as there is no major ginger market. Farmers traditionally store ginger underground.



Photos: Study Team

### ii) Traders

There are a few traders in Koraput town. Sometimes traders from other states come to the area. The traders procure ginger in three ways: i) from weekly markets, ii) farmers taking their ginger to traders, and iii) traders going to farmers. Traders in towns transport and sell ginger to wholesalers in cities such as Bhubaneswar, the capital city of Odisha, Raipur in Chhattisgarh state, and Visakhapatnam in AP. The price paid by traders is INR45 per kg.



Photos: Study Team

### iii) Wholesalers

There are wholesalers at city level. Although there is no ginger market in Odisha, wholesalers organize an association and manage the market yard for wholesale activities in Bhubaneswar. They deal with ginger, tomato, potato and garlic at the market yard. Some members of the association have cold storage for potato and other crops. A wholesaler said that about 60 percent of ginger comes from Bangalore and 70-80 percent of ginger goes to Kolkata. The wholesale price that day was INR50 per kg from Bangalore and Koraput, and INR45 per kg from Sri Lanka.



Yard for wholesalers

*Photos: Study Team*

#### iv) Retail shops

In rural areas consumers purchase ginger at nearby weekly markets. There is a wholesale-cum-retail shop in Bhubaneswar city. Retailers at the market procure ginger from the above-mentioned wholesalers. The retail price of ginger was INR50-60 per kg.



Wholesale-cum-retail shops in Bhubaneswar

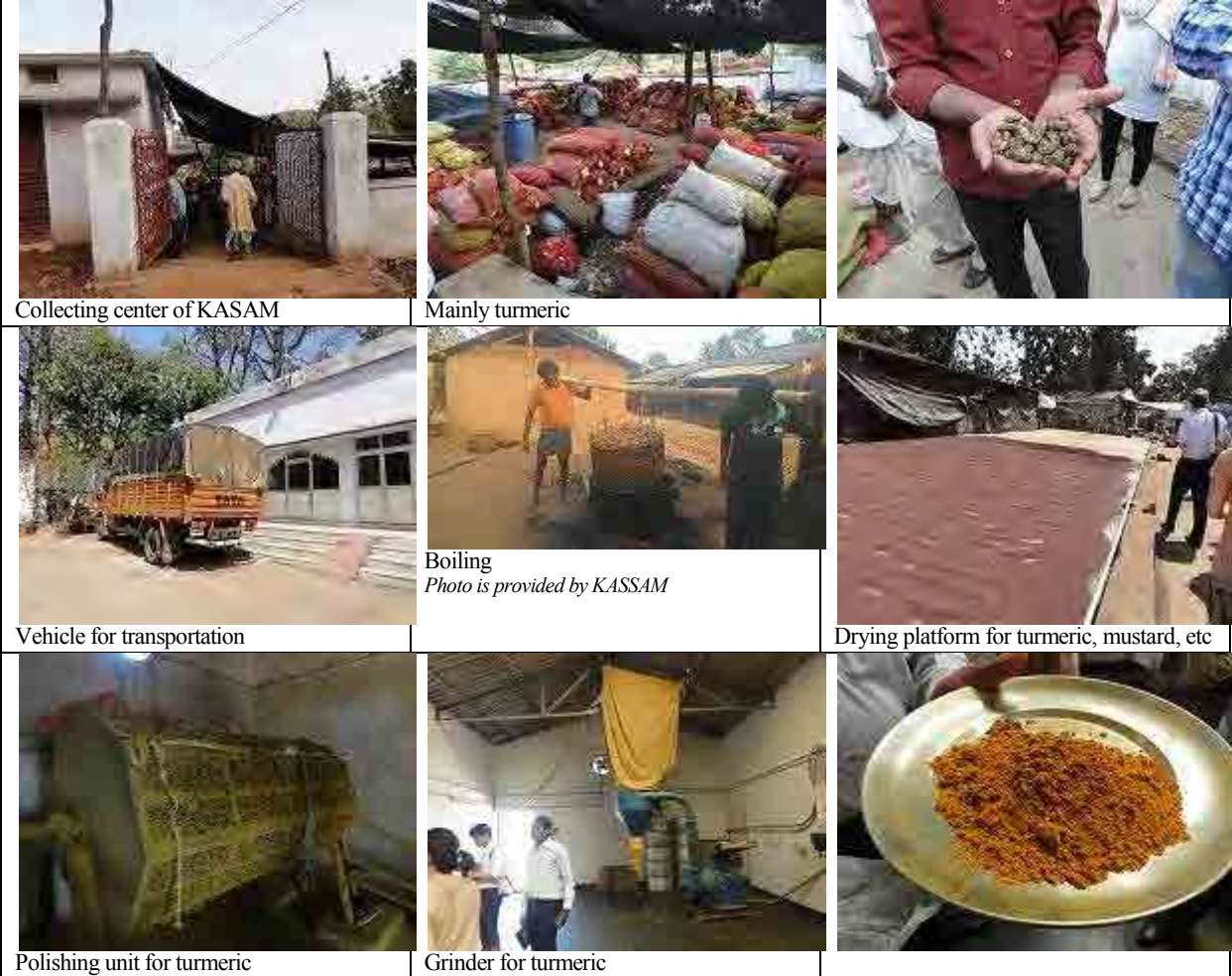
*Photos: Study Team*

#### v) KASAM

KASAM was established in 1998 under the Societies Registration Act. KASAM has about 12,000 members, who mainly belong to scheduled tribes and scheduled castes in Kandhamal District, Odisha. The objectives of KASAM include generation of employment; alleviation of poverty; extension of species area, quality of production and value-added hygienic spices; and to set up a viable marketing network to minimize exploitation by traders. KASAM sells 95 percent of their products on the international market. Since the EU, USA and Japan have certified KASAM's products as organic, they can get high value addition by selling their products as organic. They procure and process turmeric, ginger, chili, tamarind, honey and other products, but 95 percent of their sales are generated by turmeric. Although KASAM's

intervention in ginger production and marketing is limited, KASAM can be seen as a successful model of a farmers’ organization for marketing.

For turmeric marketing, KASAM set up a collecting center and collects turmeric at village level using their own vehicle. Once fresh turmeric is collected, turmeric is transported to KASAM’s processing unit, and processed to dry turmeric.



Photos: Study Team

Table 5-46: Retail price and export price of KASAM

Product	Retail price	Wholesale price for export
Turmeric powder	INR100/kg	INR90/kg
Tamarind paste	INR200/kg	
Dry chili	INR15/100g (local market quality)	INR260/kg
Dry ginger	INR50/100g	INR350/kg

Source: Study team



*Photos: Study Team*

### 3) VC assessment

#### i) Current status and evaluation of value chain

##### a) Large production volume of ginger

According to the Spice Board, in 2011/12 Odisha was the largest ginger-producing state in India with 134,980 tonnes, followed by Karnataka and Gujarat.

##### b) High profitability to farmers

According to the ADH in Koraput District, ginger is the second most profitable crop after tissue culture banana production.

##### c) Easy to transport and preserve

Poor road conditions and mountainous roads make transportation of agricultural products difficult. However ginger is relatively easy to transport, since it is hard and not perishable. Therefore there is some advantage in growing ginger in these areas, where road conditions and access to cities is poor.

##### d) Availability of organic products

Farmers traditionally practice organic farming. If they get access to international markets or high-end markets in India, ginger could be sold as an organic product with high value addition.

##### e) Successful model of KASAM in Kandhamal District for farmer organization and export of ginger

As mentioned above, KASAM in Kandhamal district can be recognized as a successful model of a farmers' organization for marketing. It could be replicated in other areas.

##### f) No existence of established market or processing unit

Unlike the chili market in Guntur, AP, and the turmeric market in Nizamabad, Telangana, there is no established market for ginger, even though ginger production in Odisha is the largest in India. Ginger is transported from trader to trader. The farm gate price may be lower than in other areas where there are direct linkages to major markets, processors or consumers.

##### g) Low productivity in some areas

According to APEDA,<sup>83</sup> although India is the second largest ginger-producing country in the world, productivity of ginger is quite low compared to China and Nepal, the largest and the third largest ginger-producing countries. The productivity of ginger in China and Nepal is 10.99 tonnes per hectare and 11.68 tonnes per hectare respectively, while in India it is only 3.58 tonnes per hectare. Productivity in Odisha is 7.87 tonnes per hectare, which is relatively high in India. However, productivity in Gujarat is more than 16 tonnes per hectare. Productivity needs to be improved to increase the income of farmers.

## **ii) Potential for upgrading VC**

### **a) Increase in productivity**

As mentioned above, improvement in productivity can bring better income to farmers.

### **b) Better market linkages**

By establishing an APMC or other market, farmers may get a better price as well as market information, such as what kinds of variety are preferred at market and other useful information. It may also be useful to consider organizing a farmers' organization for marketing, referring to the successful model of KASAM.

Establishing an APMC market or other market would benefit traders and wholesalers by reducing their transaction costs.

## **iii) Bottlenecks to be overcome**

### **a) Limited awareness of farmers of better agricultural practices**

Since there are few linkages to agricultural technology or the market, farmers do not know about improved agricultural practices to get more productivity and better prices.

### **b) Limited linkages between farmers and trader/processors/exporters**

Many farmers traditionally practice organic farming but they do not have access to the high-end market where organic products can be sold at a high price.

## **iv) Need for assistance**

- Provide farmers training on improved agricultural practices to get more productivity and better price.
- Link farmers to markets through supporting the establishment of a society or farmers' organization.

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<sup>83</sup> <http://apeda.gov.in/agriexchange/market%20profile/one/ginger.aspx>

## **6. Direction of future assistance**

### **6.1 Basic concept of AVC assistance**

Based on the findings of the study, the Study team proposes the basic concept of AVC assistance and implementation policies to be applied to all the proposed projects as explained below.

#### **(1) Basic concept of AVC assistance**

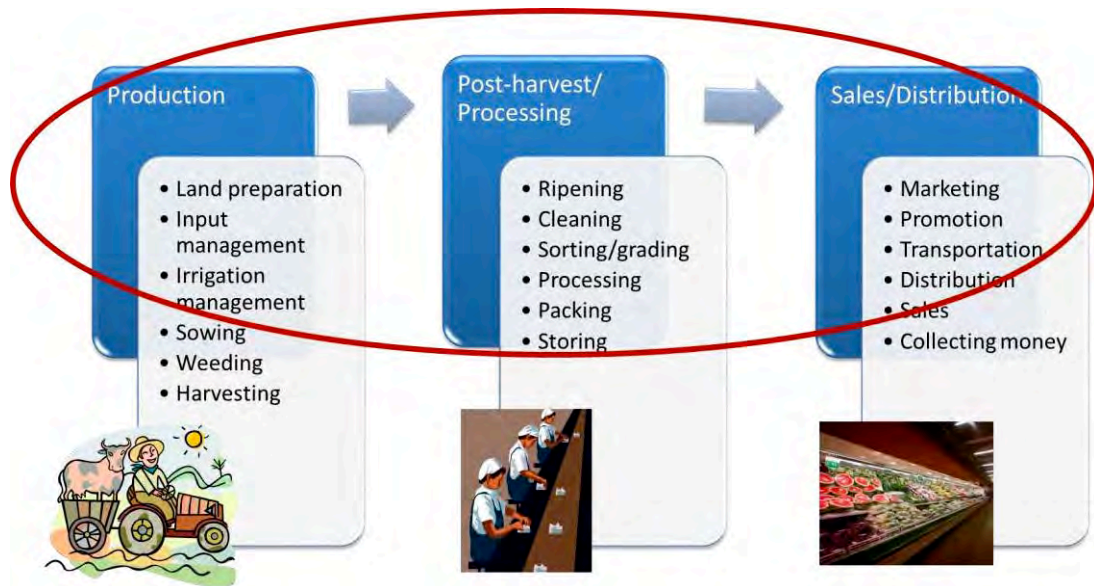
The detailed VC survey in the priority states revealed that most of major bottlenecks in VC of the priority crops have already been identified by the government, and measures to tackle these bottlenecks were taken for most of the cases. Each state government provides support for production such as drip irrigation, seeds and technical assistance, and support for post-harvest facilities such as cold storage. However, these have not been very effective. One of the reasons is that these measures are not linked with market. The VC is a series of processes which are linked together toward the final process of sales. Problems in VC are market-specific. Unless the target market is identified, the problems to overcome will not be clear. In addition, the problems in VC are interlinked and market-specific. Solving one problem in the VC does not lead to the improvement of the entire VC without concerted efforts to solve other problems in the VC.

In order to make the AVC assistance effective, linking farmers with remunerative buyers and providing assistance required by them is considered crucial. The Study team proposes the following five principles for effective AVC assistance.

- The entire VC should be assisted
- The remunerative markets should be targeted
- All stakeholders should collaborate
- Farmers should be aggregated
- Government should support the marketing of farmers

These principles are explained in more detail below.

## 1) The entire VC should be assisted



Source: Study team

Figure 6-1: The entire VC should be supported

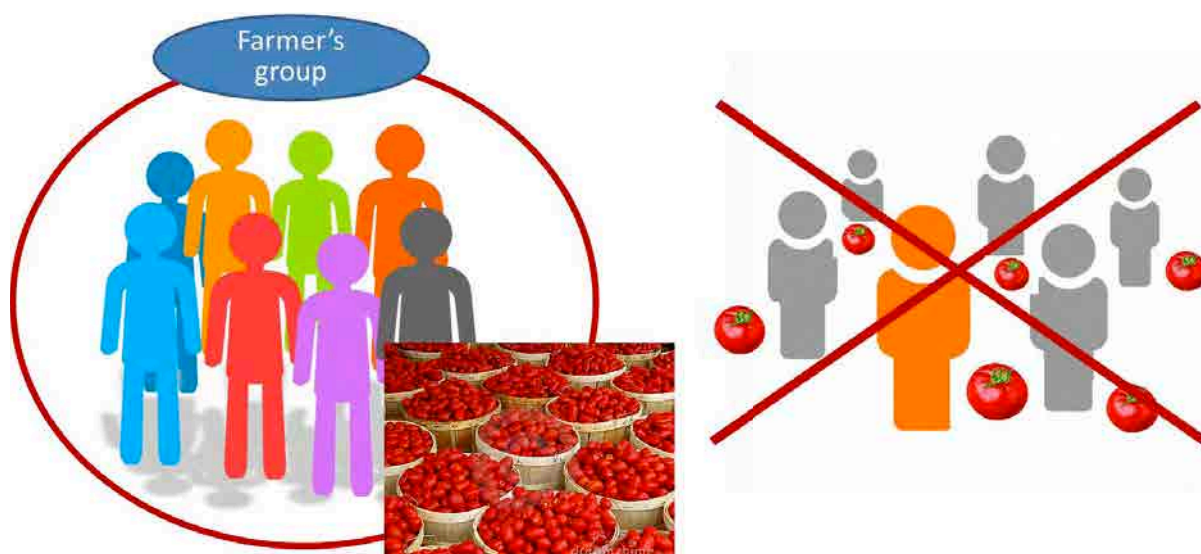
As indicated above, the support should be provided not to part of the VC, but to the entire VC. This is because problems in the VC are interlinked and the needs of assistance are different depending on which market is targeted.

This principle is especially important in terms of the motivation of the farmers. Poor farm management and poor post-harvest handling are identified as bottlenecks for various crops in the Study. The Study team found that unless the farmers are motivated by the possibility of getting a higher price, assistance for post-harvest or processing at the farm level will not be effective. As the case for mangoes in Telangana shows, farmers even give up harvesting their produce by selling them to preharvest contractors if they see no benefit of making an extra effort. The most effective way to convince farmers will be to show them actual buyers.

## 2) The remunerative markets should be targeted

A further serious issue is the imperfect domestic market. The existing APMC market is not quality-sensitive. It is important to find the right type of buyer for the desired impact. Who might these buyers be? The Study found that those from export markets in advanced countries, or those from the growing high value domestic market would compensate farmers' efforts to improve quality with higher prices. Our field survey showed exporters of processed foods and Japanese food manufacturers are very quality conscious, and they only source their material from large-scale, reliable farmers due to concerns about quality, traceability and a stable supply. Connecting small farmers to these buyers can produce meaningful results. In addition, demonstrating this model will lead to long-term productivity improvements in domestic products.

### 3) Farmers should be aggregated



Source: Study team

Figure 6-2: All stakeholders should collaborate

One of the major bottlenecks for buyers to procure materials directly from farmers is a lack of aggregation. The processors who are interested in buying directly from farmers are unable to do so as the cost of collecting the required amount of material with the required quality is extremely high.

A lack of aggregation causes a disadvantage for farmers as well. Selling their produce individually results in an increasing cost and weakening bargaining power so as to squeeze the income of the farmers.

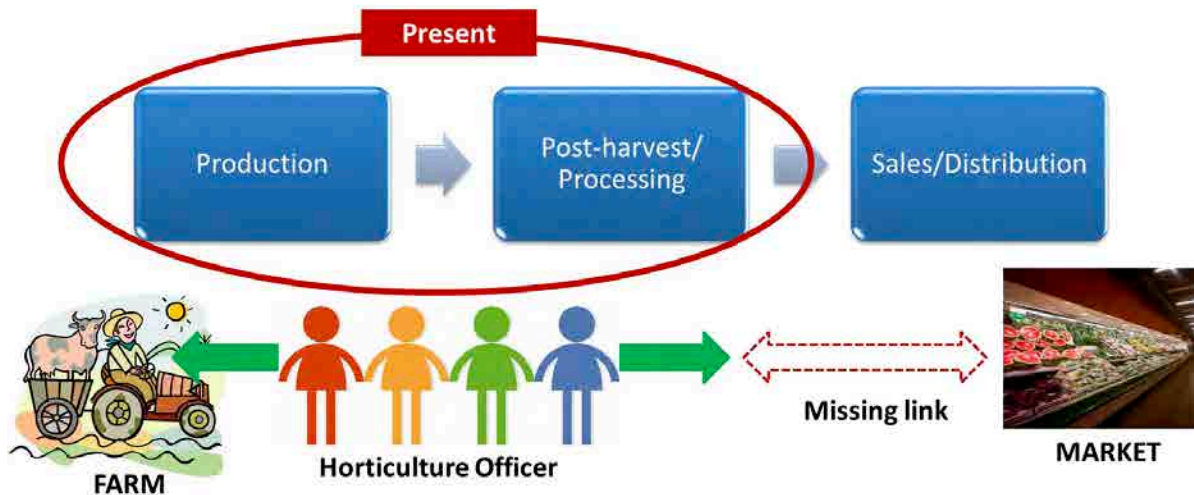
In order to provide effective assistance to the entire VC, farmers should be aggregated in any form such as cooperatives, FPO or SHG. There is an example where sincere traders organize farmers and aggregate the supply for processors<sup>84</sup>. In Japan, there are many cases where traders play a role of an aggregator for processors<sup>85</sup>. Various possibilities should be sought to achieve aggregation.

### 4) Government should play a bigger role in marketing

Although the government promotes alternative sales channels to the APMC market, such as contract farming and farmers markets, their assistance to farmers in their marketing has been very limited. The role of government in marketing at present is confined to the tasks related to the APMC market. In order to assist the entire VC, the task of government in marketing should be expanded.

<sup>84</sup> One participant for the stakeholder workshop for chili was such a trader.

<sup>85</sup> Agriculture and Livestock Industries Corporation (2008) "Present conditions of supplying vegetable to processors and institutional buyers" (<http://vegetable.alic.go.jp/yasajoho/senmon/0907/chosa1.html>)



Source: Study team

Figure 6-3: Government should play a bigger role in marketing

Supporting marketing is important as the proposed assistance targets export or domestic high value markets, which farmers have little knowledge of and networks with. If the Horticulture officers who have regular contact with farmers are equipped with market information and marketing skills, they can effectively support farmers to explore new opportunities.

### 5) All stakeholders should collaborate



Source: Study team

Figure 6-4: All stakeholders should collaborate

As the processes of the VC are interlinked, stakeholders of respective processes should collaborate to improve the efficiency of the VC. The Study team found mistrust between farmers and traders, or between farmers and processors. The mistrust is based on their past experience of opaque transactions or an asymmetry of information. The government can play an important role to ensure a conducive business

environment for both sides by setting and enforcing guidelines, sharing market information and providing assistance in problem solving. At present, the government tasks to support AVC are divided between multiple agencies. Although each department and agency has its own tools for assisting VCs, the assistance is not necessary coordinated to maximize effectiveness.

Supporting model AVCs will provide government officials with an opportunity to learn what private companies want, and to reflect these lessons in later policy measures.

#### **Column: Role of Government to support AVC – a Case in Japan**

Strengthening competitiveness of agricultural produce has become one of the policy priorities in Japanese prefectures (equivalent of state in India). Supporting AVC is a key component of this policy. Chiba Prefecture, the second biggest horticulture producing prefecture in Japan, has a separate marketing department, which is responsible for the marketing and branding of agricultural produce in the prefecture in addition to supervising the wholesale market. The department, in collaboration with other related organizations such as the department of production, agriculture cooperatives and buyers actively promote sales, processing and export of agricultural produce in the prefecture. They train core personnel in major producing areas and support establishing a collaboration mechanism.

Although it is too early to assess their achievement, they started to explore export markets for their own produce in Asia in collaboration with National Federation of Agricultural Cooperative Associations. In addition, most of major agricultural prefectures have a separate marketing department to focus on marketing and branding of the agriculture produce in the prefecture. It is especially successful for the branding of fruits such as strawberry, apples and peaches.

## **(2) Implementation policies for proposed projects**

The direction of assistance and several project proposals are explained in the following section. It is proposed that the following policies should be adopted for planning and implementation stages of the project:

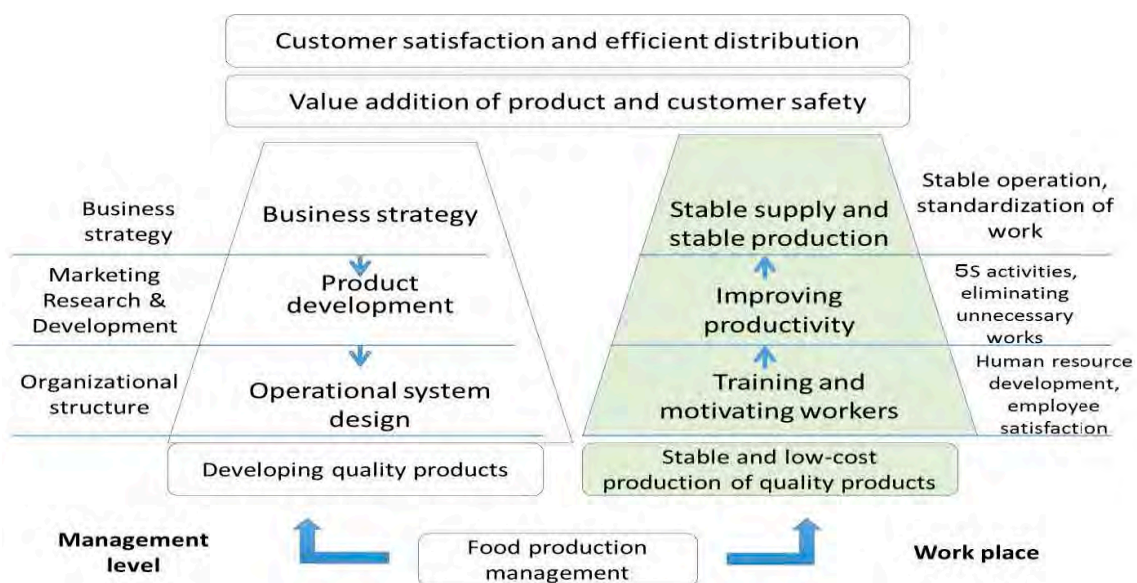
- Assistance should focus on motivating and encouraging farmers and workers to improve their capacity and productivity
- Assistance should utilize advanced technology and value addition such as Japanese
- Assistance should be designed to accommodate the different requirements of AVCs depending on the level of development of the state

**1) Assistance should focus on motivating and encouraging farmers and workers to improve their capacity and productivity**

The Study team identified low productivity as a major bottleneck at the farm level. It is especially true that poor handling of perishable produce such as tomatoes and mangoes during harvest and post-harvest processing causes a loss of value due to damage and waste. On the other hand, management in processing units, apart from management in top-class companies, is not aware of the importance of increasing labor productivity through improving labor efficiency and process management. Although they are eager to introduce new machinery and upgrade facilities, the idea of involving workers in daily activities to improve productivity is still rare.

Japan has successfully increased labor productivity through the collective effort of workers to improve quality and efficiency at the workplace through workplace organization methods such as 5S and Kaizen. New investment and management efforts are not the only way to improve quality. It is essential to involve and motivate workers to improve their workplace, work efficiency and their products. There should be a paradigm shift in the way of thinking for management - from treating workers as a simple labor force, to treating them as a key parameter for quality management. Although the type of activity may be different, this concept can also be applied to farming practices.

It is not realistic to apply Japanese concepts to India, where both the social structure and social norms are different than those in Japan. Nevertheless, the Indian labor market is experiencing a structural change as the economy develops. It is becoming more difficult to hire even unskilled labor. It is expected that the need to improve the productivity of every worker will become more important. Consideration should be given to involving and motivating workers when technical assistance is given.



Source: Study team

Figure 6-5: Concept of food production management

## **2) Assistance should utilize advanced technology and value addition such as Japanese**

There are a lot of areas where advanced technology can be useful - not only physical facilities such as cold storage or agricultural machinery, but also specialized technologies for farming and processing, as well as management systems including quality management and improving labor efficiency. In this regard, Japan has much more advanced technology such as cultivation techniques specialized for processing variety which can reduce the cost and increase the productivity. The planned assistance should utilize such advanced technology.

## **3) Assistance should be designed to accommodate the different requirements of AVCs depending on the level of development of the state**

The original concept of assistance assumed that assistance would be provided in progressive states, where more facilities and resources are available. However, as the first survey progressed, the Study team felt more need for assistance to backward states than progressive states. As most migrant laborers in progressive states come from backward states, it is considered more important to assist agricultural development in backward states so that laborers can earn a sufficient income in their home state.

Although the level of agricultural development is different between progressive states and backward states, it was found that a core and common issue is how to motivate farmers and establish a linkage between farmers and markets. However, it was also found that there are other fundamental bottlenecks hindering farmers from selling their produce in markets, such as a lack of infrastructure, a low level of farming and a lack of a market system. Without tackling these bottlenecks, linking farmers to the market will not be effective.

## **6.2 Priority state 1: Andhra Pradesh**

### **6.2.1 Direction of assistance**

#### **(1) Opportunities and Threats for AP crops**

The AP government is striving for double digit inclusive growth based on the rolling plan for 2015/16, which aims to be the best state in India by 2029/30. It is a very ambitious and comprehensive plan for AP to consolidate the efforts of all stakeholders to achieve the target.

The Study on the three priority crops in the state, namely mangoes, tomatoes and chili found both opportunities and threats. On the positive side, the demand of these crops in both the domestic and export markets, as well as both fresh and processed forms, is increasing. With favorable agro-climatic conditions, strong production capacity and other necessary resources, the state is capable enough to seize these rising opportunities.

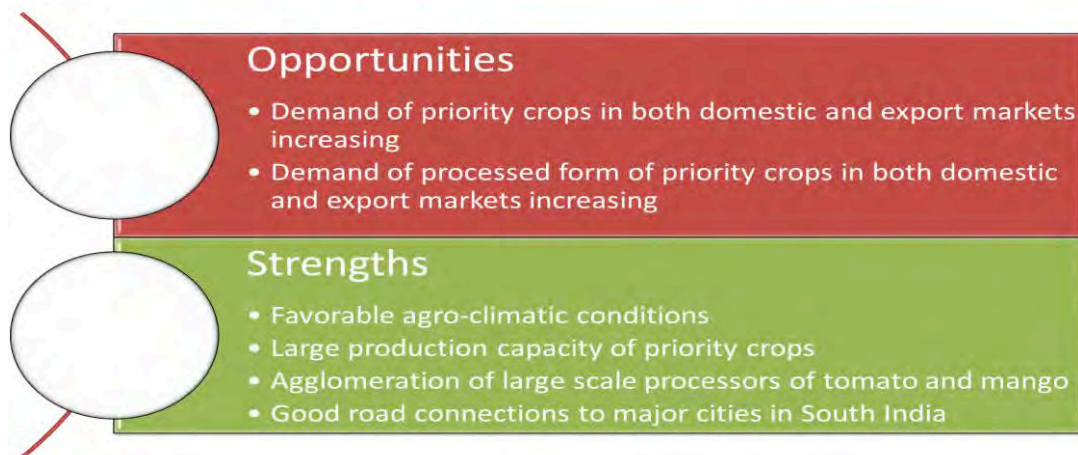


Figure 6-6: Opportunities and strengths for priority crops in AP

On the other hand, growing awareness on food safety both in the domestic and export markets and tightening safety regulations, especially in the export market, is certainly a threat which jeopardizes such opportunities for AP. Due to this, low quality, low safety and a low image are the weaknesses that priority crops in AP need to overcome.



Figure 6-7: Threats and weakness for priority crops in AP

Unless the state government takes effective measures to rectify these weaknesses, the impending threats may ruin the precious opportunity for AP crops to grow and expand their market share.

## (2) Direction of government intervention

The strategies set out in the rolling plan, including focusing on irrigation and promoting FPOs, are all valid in achieving inclusive agricultural growth and are in line with the findings of the Study. What is missing,

however, is a mechanism to support the entire VC and targeting a specific market. Problems in the VC are interlinked. Solving one problem in the VC does not lead to the improvement of the entire VC.

Linking farmers to the market or buyers which can utilize the opportunities explained above and who can provide assistance to remove the bottlenecks in the VC will be a type of assistance needed in order to make the VC more efficient. Once the VC becomes efficient enough to transfer market information to producers and to pay producers price differentials to high value and high quality products, it is natural for producers to make efforts to accommodate market requirements. In the long run, these efforts will lead to improved quality and safety of the agricultural produce in all of AP and even in India as a whole.

In order to assist the entire value chain, the method of government intervention should also be changed. The tasks and measures of the government to support AVC should be transformed to become more market oriented. More specifically, the task, structure and policy measures of government should be changed in the following way:

### **1) Tasks of government**

The tasks of government to assist the AVC should be transformed in the following directions.

#### **● From production-oriented to market-oriented interventions**

The current government tasks mainly focus on production. However, in order to assist the entire VC, all interventions should be more market-oriented and all the assistance should be connected from production to sales. In particular, assistance should be provided to farmers for their marketing products.

#### **● Establish and present a model of new VC transaction**

Although the dominant marketing channel of farmers is the APMC market at present, the direct sales between farmers and buyers such as processors will increase in future. Direct sales to buyers tend to be exploitative for farmers who have limited bargaining power, as is the case in Chittoor, where the farmers have a strong sense of mistrust toward processors due to past experience of exploitation. In order to promote contract farming, which is beneficial for farmers if implemented properly, there is an acute need for the government to ensure that fair and transparent transactions take place by supervising or showing a model or guidelines for the stakeholders to follow.

#### **● Be a marketing manager for all crops in the state**

In future, the state government should act as a marketing manager for all crops in the state. In order to compete with crops produced in other states in the domestic market, as well as crops in other countries in the export market, a consolidated marketing strategy, including branding of the state crops and marketing

activities in collaboration with private stakeholders will be required in a similar way as the state government is doing to attract foreign investment.

**2) Structure of government**

There should be a sort of coordination mechanism at the policy level involving relevant government departments and institutions such as the Department of Horticulture, Agricultural Marketing, Food Processing Society, APEDA and NABARD, representatives of the private sector and farmers. Their task is to formulate and monitor a plan to promote specific crops, discuss and coordinate the interests of different stakeholders on specific crops.

At the field level, the task of Horticulture officers should be extended to cover marketing and their task should be more market-oriented. Present and proposed government interventions at the field level are summarized below.

Table 6-1: Present and proposed government interventions at field level

Process	Present interventions	Proposed interventions
Production and post-harvest	<ul style="list-style-type: none"> <li>• Department of Horticulture provides technical assistance and supports the applications of farmers for subsidies.</li> <li>• Technical assistance does not necessarily reflect market needs.</li> </ul>	<ul style="list-style-type: none"> <li>• Technical assistance should be directed to reflect market needs such as introducing varieties and techniques which satisfy the market requirements.</li> </ul>
Marketing and sales	<ul style="list-style-type: none"> <li>• Department of Agricultural marketing develops market infrastructure, provides licenses, supervises market transactions and collects market fees.</li> <li>• No assistance given to farmers to market and sell their produce.</li> </ul>	<ul style="list-style-type: none"> <li>• Department of Horticulture should provide farmers with market information and opportunities for matching with buyers.</li> </ul>

Source: Study team

Assisting farmers in marketing their produce is in principle considered as a task of the Department of Agricultural Marketing. However, as indicated in 5.2.2, the officials at the Department of Agricultural Marketing lack the knowledge of production as well as skills required for marketing, as their main task is to supervise the APMC market. On the other hand, Horticulture officers have regular contact with farmers, and have knowledge about production. Some officers in Chittoor, where many processing firms are located, have a network not only with farmers, but also with processors and buyers. They naturally carry out tasks to connect farmers to buyers. Based on these conditions, it is considered easier and appropriate to expand the tasks of Horticulture officers by providing more opportunities to learn the markets.

### 3) Policy measures

It is not possible to propose specific measures to support the entire VC, as these measures are crop and area-specific. However, the important principle is that these measures should not be fixed for a long time but should be flexible according to the changing needs of the markets. The possible direction of policy measures are listed below based on the Study outcomes:

- Make forming a group a condition to receive assistance so as to promote groups of farmers.
- Preference should be given to those farmers who try to do contract farming or supply directly to processing industries.
- Provide measures to mitigate risk arising from contract farming so as to promote contract farming.
- Provide matching opportunities between farmers and buyers.

#### **Column: Support for increasing linkage between producers and processors – a Case in Japan**

##### 1. Background

- Declining domestic demand of fresh vegetables in Japan
- Increasing demand of vegetables as a raw material of processed or cooked food

##### 2. What does MAFF do?

- Provide matching opportunities for farmers and processors
- Provide subsidies against the improvement plan of producer organizations that have supply contracts with processors
- Applicants are obliged to carry out at least three reforms in soil improvement, pest management, water retention and drainage.
- Applicants should produce and supply raw materials which fulfill the needs of processors
- The Horticulture department of the prefecture should be involved in the application process.

##### 3. Assessment of the scheme

The scheme just started in 2014/15. It is too early to assess the effectiveness. The scheme attracted farmers' high attention. There were applications about 40% exceeding the budget limit.

## **Column: Support for contract farming - a Case in Japan**

### 1. Background

- Increasing share of horticulture crops which are not sold through the existing wholesale system
- Difficulties for farmers and processors to find the appropriate partners for contract farming
- Difficulties of farmers to meet the requirements of processors

### 2. What does MAFF do?

- Provide subsidies to cover the cost of procuring materials to meet contract requirements during a bad harvest
- Provide subsidies to compensate the loss of farmers at the time the market price is higher than the contract price

### 3. Assessment of the scheme

Although the scheme has a lot of benefits to farmers, its utilization rate is not very high. There are two reasons:

- The scheme has not been fully informed to the farmers in need as most of farmers who do contract farming are individual farmers or private producer companies while those farmers who normally utilize the government schemes belong to the agricultural cooperatives which function as a focal point for the government subsidy.
- In order to use the scheme, the farmer has to register themselves to the organization administering the scheme. As the procedures for registration are complicated, farmers do not take extra efforts to do so.

## **(3) Direction of assistance**

- 1) Through implementation of pilot projects which assist the entire VC of specific crops, assist the AP government in developing a mechanism and strengthening the capacity of government officers to support the entire VC.
- 2) The pilot projects to be assisted aim to achieve strategies which overcome weakness and maximize opportunities for specific crops. The proposed pilot projects for priority crops are shown below:



Source: Study team

Figure 6-8: Proposal for a pilot project in AP

- 3) Through implementation of the pilot projects, the tasks and responsibility of government organizations including the Department of Horticulture and necessary measures to assist the entire VC will be clarified and reflected in the government structure and policies. The pilot projects aim to develop a model or guidelines for other crops or other areas to follow.
- 4) Apart from the pilot projects, the following types of assistance are considered effective if they are provided as a part of a planned irrigation project.
  - Drip irrigation system and crates
  - Establishing more export facilities and strengthening quarantine capacity in AP
  - Strengthening the testing capacity for chemical residues and aflatoxin
  - Increasing awareness of the VC stakeholders and consumers regarding food safety

Implementing pilot projects look a slight distance into the future. Nevertheless, these aim to establish a model for other crops and other areas to follow. Dissemination of a model in the long run can contribute to improving efficiency of the VC for all the crops in the state, improving crop quality and safety, and finally improving a farmer's income. If the state government understands the importance of the proposal, places a

high priority and diligently implements it, it will certainly contribute to achievement of the state target of being the best state in India.

## **6.2.2 Project proposal**

### **(1) Long term objective and short term objectives**

The long term objectives of assistance are to develop a sustainable food value chain in AP which consists of the following three goals:

- The quality and safety of AP crops is improved.
- The competitiveness of the food industry in AP is enhanced.
- The income of farmers is improved and stabilized.

The short term objective of assistance is to increase the efficiency of the food value chain for target crops in AP, which consists of the following three goals:

- A mechanism and capacity of the Government to assist the entire VC for target crops is developed *through pilot projects*.
- A mechanism to coordinate various stakeholders for target crops is developed *through pilot projects*.
- The farmers' ability to manage their farm according to market conditions is improved *through pilot projects*.

### **(2) Pilot projects**

#### **1) Mangoes**

##### **i) Table purpose variety**

##### **a) Purpose of the pilot project**

Strengthen the brands of AP made fresh mangoes by improving their quality and promoting them in domestic and international markets.

##### **b) Activities**

###### **● Overall**

- Develop a coordination mechanism to develop AP fresh mangoes

###### **● Cultivation**

- Provision of training on proper cultivation and pest and disease management
- Support to introduce certificates such as GAP and/or related standards
- Encourage farmers to formulate farmers groups with the provision of incentives
- Provision of credit/financial support for a target group with training on farm management

- **Post-harvest management and treatment**
  - Set up or upgrade post-harvest facilities such as ripening chambers, grading and treatment facilities, and storage, and improve the linkages between these facilities and farmers
  - Provision of training on post-harvest management to farmers
  - Support for capacity building for a quarantine and phytosanitary authority
- **Marketing**
  - Support farmers to find out the sales channels of high quality mangoes
  - Support to enhance public awareness on the danger of ripening due to calcium carbide
  - Support to improve the marketing capabilities of the governments and exporters to promote AP mangoes in the target international markets

In the case of mangoes, just applying a proper ripening method has proved to be profitable for farmers, even when the produce is sold at a local wholesale market. Farmers can get a higher price if they sell their produce to exporters. More value addition is possible if simple processing facilities such as treatment and packing facilities and dryers are set up at the village level. In this way, the gradual upgrading of activity is possible, depending on the willingness of farmers.

## **i) Processing variety**

### **a) Purpose of the pilot project**

Enhance the competitiveness of mango processing industries by improving the quality of fresh and processed mangoes and strengthening the linkages between farmers and processors.

### **b) Activities**

- **Overall**
  - Develop a coordination mechanism to develop mango processing industries
- **Cultivation and post-harvest management**
  - Provision of training on proper cultivation and pest and disease management which includes IPM
  - Provision of credit/financial support to bridge the gap during changing farming practices for the target group.
  - Provision of training on farm management, which includes education on finance and investment
  - Provision of training on post-harvest management such as ripening, grading, and packing to farmers
  - Provision of new technology and materials such as decomposable crates for post-harvest handling
- **Logistics and supply chains (between farmers and processors)**

- Encourage farmers to formulate farmers groups for collective sales and shipments (with the provision of incentive and subsidies if necessary)
- Support to promote an organized procurement mechanism of mangoes by processors, which include the promotion of meetings between farmers and processors and support for setting up collection points
- **Processing and marketing**
  - Upgrade the processing industry by supporting the technical capacity of quality management, kaizen, 5S, and food safety as well as the acquisition of certificates such as HACCP and ISO
  - Support marketing of processors by linking with food manufacturers

## **2) Tomatoes**

There is remarkable potential in the tomato processing industry in AP, especially in Chittoor and surrounding areas, as the profits of farmers can be ensured by introducing processing variety with appropriate farm management. In order to promote the tomato processing industry, the Study team proposes a pilot project. The purpose, major activities and allocation of experts of the pilot project are summarized below.

### **a) Purpose of the pilot project**

Enhancing the competitiveness and production of processed tomato products, especially tomato paste, by setting up strategic tomato producing areas for processing variety and strengthening linkage between farmers, processors, and buyers

### **b) Activities**

- Study and identify cost effective cultivation methods, including the selection of varieties, and cultivation of processing variety.
- Develop a strategic plan to promote the tomato processing industry in Chittoor and surrounding areas.
  - Identify and/or develop cultivation areas for processing variety by confirming factors such as a stable supply of tomatoes against unexpected weather and outbreaks of insects and disease, sufficient water supply for tomato cultivation, the farmers' farm management level, and accessibility to processors.
  - Demonstrate and disseminate the identified cost effective cultivation methods, including selection of varieties, of cultivation of processing variety.
  - Provide incentives, including assurance of price, to farmers to cultivate a processing variety of tomato in the selected tomato cultivation areas.
  - Encourage farmers to formulate farmers groups by providing incentives such as subsidies.

- Provide training to tomato processors for upgrading and standardizing food processing operation such as contract farming, material handling, 5S, Kaizen, and food safety.
- Develop a coordination mechanism to promote processed tomatoes.
- Implement pilot activities based on the strategic plan mentioned above.
- Revise and finalize the plan based on the outcomes of the pilot project.

### **3) Chili**

#### **a) Purpose of the pilot project**

Increasing export competitiveness (promoting the Guntur chili brand) by strengthening linkage between farmers and exporters and upgrading the IPM/drying technique

#### **b) Activities**

- Study target markets and develop a plan to promote the Guntur chili brand
- Develop a coordination mechanism to promote Guntur chili
- Facilitate linkage between farmers and processors/exporters
- For farmers
  - Encourage farmers to formulate farmers groups by providing enough incentives for better linkage with processors/exporters
  - Provide training for improving farming practices such as IPM, ICM and post-harvest practices such as drying and grading
- For processors/exporters
  - Provide training for supply chain management including traceability
  - Provide training for quality management and productivity improvement such as 5S, Kaizen, and so on
  - Support marketing such as introducing importers
- Enhance the capacity of existing laboratories for analysis of agrochemical residues and aflatoxin

#### **6.2.3 Required input**

The proposed pilot projects require the input of experts and some pieces of equipment or material. This section explains the required input for the proposed pilot projects as well as input which are considered effective if they are provided as a part of a planned irrigation project.

#### **(1) Input for the pilot project**

The major role of the experts and the input required for each pilot project are summarized below.

### 1) Mango (for table purpose)

Expert Field of assistance		Technical support					Necessary inputs
		Organizational management/ facilitation	Cultivation	Post-harvest management	Farm management/ Marketing	Community development	
<b>Overall</b>	Develop a coordination mechanism to develop AP fresh mango	✓					
<b>Cultivation</b>	Provision of training on proper cultivation and pest and disease management		✓				Drip irrigation Fertilizer Pesticide
	Support to introduce certificates such as GAP and/or standards		✓				
	Encourage farmers to formulate farmers groups with the provision of incentive					✓	
	Provision of credit/financial support for the target group with the training on farm management				✓		
<b>Post-harvest management and treatment</b>	Set up or upgrade post-harvest facilities such as ripening chambers, grading and treatment facilities, and storage, and improve the linkages between these facilities and farmers			✓			Cold storage, treatment facilities.
	Provision of training on post-harvest management to farmers			✓			Crates
	Support for capacity building for quarantine and phytosanitary authority			✓			
<b>Marketing</b>	Support farmers to find out the sales channels of high quality mangoes				✓		
	Support to enhance the public awareness on the danger of ripening by calcium carbide				✓		
	Support to improve the marketing capabilities of the governments and exporters to promote AP mango in the target international markets				✓		
<b>M/M for expert (for 2 years)</b>		4	5	4	5	2	
<b>Total M/M (for 2 years)</b>		20					

※ The periods of distach for “cultivation”, “post-harvest management”, and “community developmen” experts are suggested to include the harvesting period of mango, which is mainly from Mid-May to Mid-June.

※ The period of distach for “markting” experts is suggested to include the harvesting period of mango (which are described above) and subsequent period of sales of mango, which spans until the beginnig of July.

## 2) Mango (for processing purpose)

Expert Field of assistance		Technical support				Necessary inputs	
		Organizational management/facilitation	Cultivation	Post-harvest management	Farm management/supply chain management		Processing
Overall	Develop a coordination mechanism to develop mango processing industries	✓					
Cultivation and post-harvest management	Provision of training on proper cultivation and pest and disease management (which includes IPM)		✓				Drip irrigation Fertilizer Pesticide
	Provision of credit/financial support to bridge the gap during changing farming practice for the target group.				✓		
	Provision of the training on farm management, which include the education on finance and investment				✓		
	Provision of training on post-harvest management (ripening, grading, and packing) to farmers			✓			Crates Facilities if necessary
Logistics and supply chains (between farmers and processors)	Encourage farmers to formulate farmers groups for collective sales and shipment (with the provision of incentive and subsidy, if necessary)				✓		
	Support to promote organized procurement mechanism of mango by processors, which include the promotion of meetings between farmers and processors and the support for setting up collection points				✓		
Processing and marketing	Upgrade the processing industry by supporting technical capacity of quality management, kaizen, 5S, food safety as well as the acquisition of such certificates as HACCP and ISO					✓	
	Support marketing of processors by linking with Japanese companies				✓		
<b>M/M for expert (for 2 years)</b>		4	4	3	5	2	
<b>Total M/M (for 2 years)</b>				18			

※ The periods of distach for “cultivation” and “post-harvest management” experts are suggested to include the harvesting period of mango, which is mainly from Mid-May to Mid-June.

※ The periods of distach for “marketing” and “farm management/supply chain” experts are suggested to include the harvesting period of mango and subsequent period of sales of mango, which spans until the beginnig of July.

※ The period of distach for “processing” experts is suggested to include the processing period of mango, which is mainly from June to July.

### 3) Tomato

Expert	Technical assistances				Necessary inputs
	Strategic plan development/ Institutional	Tomato cultivation/ Farm management	Marketing/ Extension	Food processing/ 5S/ Kaizen	
Field of assistance					
1) Study and identify cost effective cultivation methods, including selection of varieties, of cultivation of processing variety		✓✓			Seed, necessary materials for cultivation
2) Develop a strategic plan to promote tomato processing industry in Chittoor and surrounding area	✓✓	✓	✓	✓	
2-1) Identify and/or develop cultivation areas for processing variety by confirming stable supply of tomato against unexpected weather and outbreak of insect and disease, sufficient water supply for tomato cultivation, farmers ' farm management level, and accessibility to processors etc.	✓✓	✓	✓		
2-2) Demonstrate and disseminate the identified cost effective cultivation methods, including selection of varieties, of cultivation of processing variety			✓✓		
2-3) Provide incentive, including assurance of price, to farmers to cultivate processing variety of tomato in the selected tomato cultivation areas	✓✓		✓		
2-4) Encourage farmers to formulate farmers groups by providing incentive such as subsidy	✓		✓		
2-5) Provide training to tomato processors for upgrading and standardizing food processing operation such as contract farming, material handling, 5S, Kaizen, and food safety				✓✓	
3) Develop a coordination mechanism to promote processed tomato	✓✓	✓	✓	✓	
4) Implement pilot activities based on the strategic plan mentioned above	✓✓	✓	✓✓	✓✓	Drip irrigation, crates, storage facility if required
5) Revise and finalize the plan based on the outcomes of the pilot project	✓✓	✓	✓	✓	
<b>M/M for expert (for 2 years)</b>	6.5	7	6	2	
<b>Total M/M (for 2 years)</b>	21.5				

※ The expert of “Tomato cultivation/Farm management” needs to be dispatched mainly during Ravi sason, from October to March.

※ The expert of “Marketing/Extension” needs to be dispatched at least during harvest period of Ravi sason, from December to March.

#### 4) Chili

Technical support		Experts					agrochemical residues analysis	Necessary inputs
		Strategic plan development/ Institutional development	Chili cultivation/ Farm management	Marketing/ Branding	Farmers organization/ Extension	Food processing/ 5S/ Kaizen		
Activities								
1) Study target markets and develop a plan to promote Guntur chili brand		✓	✓	✓✓	✓	✓		
2) Develop a coordination mechanism to promote Guntur chili		✓✓			✓			
3) Facilitate linkage between farmers and processors/exporters					✓✓			
For farmers	4) Encourage farmers to formulate farmers group by providing enough incentive for better linkage with processors/exporters	✓✓			✓			
	5) Provide training for improving farming practice such as IPM and ICM and post-harvest practice such as drying and grading		✓✓		✓	✓	Seed, necessary materials for cultivation	
For processors/exporters	6) Provide training for supply chain management including traceability					✓✓		
	7) Provide training for quality management and productivity improvement such as 5S, Kaizen, and so on					✓✓		
	8) Support marketing such as introducing Japanese companies				✓✓	✓		
9) Enhance capacity of existing laboratories for analysis of agrochemical residues and aflatoxin							✓✓ Necessary inputs	
<b>M/M for expert (for 2 years)</b>		6.5	5	2	5	2	1.5	
<b>Total M/M (for 2 years)</b>		22						

※ Cultivation of chili seedling starts from June and chili for dry chili is harvested mainly from February to May. Therefore the expert of “Chili cultivation/Farm management” needs to be dispatched any time necessary throughout a year.

## (2) Inputs for the planned irrigation project

Although the Study team considers that the most effective way of assistance for VC is to assist the entire VC, there are some measures which are beneficial if implemented independently. The Study team proposes to include these measure in the planned irrigation project in AP. The measures to be included in the irrigation project and consideration for assistance are explained below.

Table 6-2: Measures and consideration for assistance

Measures	Consideration for assistance
Inputs other than experts for the pilot projects	Timely provision of necessary equipments and materials. The type and number required should be decided when the details of pilot project are designed.
Providing drip irrigation system	These measures are the extension of existing government schemes such as NMSA. The basic procedures of respective schemes should be followed such as 10-50% contribution from beneficiary <sup>86</sup> . In addition, in order to facilitate aggregation of farmers and direct sales from farmers to processors and buyers, the following conditions may be followed. <ul style="list-style-type: none"> <li>● Preference should be given to a member of farmer's group</li> <li>● Preference should be given to those who try to supply their produce to processors or direct buyers</li> </ul>
Providing crates for post-harvest handling of tomato and mango	
Cold storage/pack house and VHT facility for mango export near the airport of Vijayawada and Vishakhapatnam	These measures are considered indispensable in order to promote export of AP crops. However due to time constrain and framework of Study, it was not possible for the Study team to assess the magnitude of needs, details of facilities including location and types of technical assistance.
Capacity building of quarantine and phytosanitary authority	These issues should be discussed with respective authorities once the decision is made to provide the said assistance.
Strengthen testing capacity of pesticide and aflatoxin residue and to enhance capacity, as well as facilities for HACCP, CODEX standards and risk analysis in accordance with required regulations.	Both the Study team and higher authority of AP government are fully aware of the importance of strengthening testing capacity for food safety. There was a specific request from Horticulture commissioner of AP government to provide testing kits for aflatoxin and chemical residue at every APMC market in AP. However, developing a concrete proposal for the required testing facilities was not possible due to time constrain and lack of technical expertise.  Considering the importance and urgency of the needs, the Study team recommend JICA to study the needs and feasibility carefully and

<sup>86</sup> For NMSA, beneficiary contribution is defined as 0% for scheduled castes or scheduled tribes, 10% for small and marginal farmers and 50% for other farmers.

Measures	Consideration for assistance
	<p>provide appropriate assistance. The study team got preliminary information on the approximate cost of setting up laboratory as follows:</p> <ul style="list-style-type: none"> <li>● For chemical residue : <ul style="list-style-type: none"> <li>a) Triple quadrupole gas chromatography - mass spectrophotometer</li> <li>b) Liquid chromatography- mass spectrophotometer</li> </ul> </li> </ul> <p>Both the above equipment would be required to test the complete range of pesticides in foods. Cost of each of the above equipment will be approximately INR 10 million.</p> <ul style="list-style-type: none"> <li>● Aflatoxin : <ul style="list-style-type: none"> <li>a) High performance liquid chromatography with fluorescence detection and kobra cell. This is the equipment used in most reputed laboratories. Cost of the equipment is approximately INR 4 million.</li> <li>b) Elisa Kits (field level kits for Aflatoxin). These equipment would only indicate the presence or absence of aflatoxin as per the range of equipment/ kit. It has limitations as it does not provide the results if it is beyond the specified range of the kits which is presently very narrow. The cost of Elisa reader and washer is approximately INR 1 million.</li> </ul> </li> <li>● Comprehensive food quality and safety laboratories: <p>The laboratories with capabilities of undertaking food safety analysis such as chemical residue, heavy metals, drug and antibiotic residues, organic compound residue, microbiology, mycotoxin including aflatoxins, enzymes and hormones, nutritional analysis , additives, etc. The approx. cost involved in establishment of such a laboratory would be INR 100 million.</p> <p>As indicated in 5.2.2 (5), AP government has a plan as a part of food processing policy to provide incentives to private sector who are willing to invest in testing facilities. Any assistance for testing laboratories should collaborate with the said government plan. The AP Food Processing Society should be a focal point of discussion for this issue.</p> </li> </ul>

Measures	Consideration for assistance
Increasing awareness of VC stakeholders and consumers on food safety	Calcium carbide for ripening mango and chemical residue and aflatoxin are the major issues about food safety for priority crops in India. Although there are government regulations to prohibit or limit the materials, the practices continue due to weak enforcement and lack of awareness among consumers on the possible health risk of these materials. Unless there is a pressure from the market, it is considered extremely difficult to change the farmer's practices. In order to raise the consumer awareness as well as VC stakeholders, conducting awareness campaign is effective by employing the NGOs or collaborating with FSSAI.

Source: Study team

### 6.3 Priority state 2: Telangana<sup>87</sup>

#### (1) Direction of Assistance

The Study team identified a major bottleneck in Telangana as the lack of alternative marketing channels which can offer better prices and opportunities for farmers. The state has a favorable climate, well-developed infrastructure, such as irrigation, and rich natural resources. The productivity of most crops exceeds the national average.

Markets and marketing channels are lacking. There is only one wholesale market for turmeric. Although the state is the largest turmeric producer the market is only the third largest, and farmers have to go to a market in other states to get a better price. Turmeric farmers do not have the linkages with processing companies available to farmers in other major turmeric-producing states.

Similarly mango farmers have very limited marketing channels. They suffer from the existing APMC market system. Many farmers have even given up harvesting and selling their own mango, leasing their orchards to pre-harvest contractors. Although their fruit has good potential, this practice severely limits the opportunity for farmers to benefit from VCs.

Therefore assistance to Telangana should aim to increase marketing opportunities by providing linkages with processors and exporters, and setting up retail sales points for farmers.

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<sup>87</sup> As indicated in 5.1 (4), description of this section is not as detailed as that of AP since the additional survey (third field survey) was conducted only in AP.

Table 6-3: Project proposal for Telangana

Category	Proposed program/projects
Comprehensive program	Comprehensive food sector development based on master plan (all potential crops)
Independent projects/ pilot projects in a comprehensive program	(1) Link farmers to processing companies for turmeric
	(2) Increase value addition of mango (table varieties) by promoting post-harvest and processing activities in rural areas

## (2) Project proposal

### 1) Comprehensive program: comprehensive food sector development based on master plan

#### a) Outline of the program

This program aims to assist Telangana state government in formulating a master plan for developing the food sector and to implement the plan afterwards. The program contains pilot projects which can be implemented during formulation of the master plan, in order to test some of the ideas for strengthening linkages between farmers and markets. The major project components are listed below.

- i) Study and map existing farmers' cultivation patterns and existing processing units for the potential crops for processing.
- ii) Market study for food products utilizing potential crops.
- iii) Formulate a draft plan to develop the food sector in Telangana
  - Plan for matching raw material production and processing
  - Plan to attract investment for food processing
  - Plan to improve productivity and quality of crop production
  - Plan to improve productivity and quality of processing unit
  - Plan to strengthen support system of government
  - Marketing plan
  - Guidelines for upgrading and standardizing food processing operations, such as contract farming, material handling and food safety.
- iv) Implement pilot projects based on the above plan.
- v) Revise and finalize the plan based on the outcome of pilot projects.

As there are currently few processing units in Telangana, the master plan includes a plan to attract investment for food processing. In addition, opportunities will be sought for matching farmers in Telangana with processing companies outside the state, and for developing marketing channels other than processing.

**b) Required experts**

In order to implement the above project, the following experts will be required.

- Strategic plan development/Institutional development
- Cultivation/Farm management
- Marketing/Extension
- Food processing/5S/Kaizen

**c) Required inputs**

In order to implement the above project, the following inputs will be required.

- Seed, necessary material for cultivation including irrigation facility if required
- Crates if required

**2) Independent projects/pilot projects**

**(1) Link farmers to processing companies aiming to export turmeric**

The Project aims to provide small farmers with an alternative marketing channel which offers them a better purchasing price, so as to increase farmers’ income and improve their farming skills. It is also expected that the quality of raw materials and final products will be upgraded by improved communication between farmers and processors, and improved skills of farmers and factory workers. In order to ensure effective project implementation, farmers and processors should be chosen based on proposals submitted by prospective farmer groups and processing companies, as their motivation and awareness is key for success.<sup>88</sup>

The project consists of the following activities.

- Match farmers and processors
- Provide assistance to farmers and processors

Farmers	Processors
<ul style="list-style-type: none"> <li>➤ Provide training for improving farming practices, IPM and ICM</li> <li>➤ Provide training for improving post-harvest practices such as drying and grading</li> </ul>	<ul style="list-style-type: none"> <li>➤ Provide training for quality management and productivity improvement</li> <li>➤ Provide training for supply chain management including traceability</li> </ul>

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<sup>88</sup> The SHEP approach developed and promoted by JICA.

Farmers	Processors
➤ Assist development of physical facilities such as <b>dry houses and harvesters</b>	➤ Support marketing ➤ Support technical upgrade

- Develop capacity of relevant government departments.

The training provided to processing companies aims to improve workers' productivity. As indicated in the previous section, factory productivity depends to a great extent on the productivity of workers. The same concept is to be applied to agricultural labor. In the case of turmeric, a major issue for farmers to overcome is improper drying practices. Priority will be given to training in these areas.

Efforts will be made to provide processing companies with linkages to importers that are interested in buying products from India.

#### i) Required experts

In order to implement the above project, the following experts will be required.

- Strategic plan development/Institutional development
- Cultivation/Farm management
- Marketing/Extension
- Food processing/5S/Kaizen

#### ii) Required inputs

In order to implement the above project, the following inputs will be required.

- Seed, necessary material for cultivation including irrigation facility if required

### **(2) Increase value addition to mango (table varieties) by promoting post-harvest and processing activities in rural areas**

The project aims to increase value addition at village level by promoting post-harvest and processing activities. This project does not involve processing companies, but aims to develop an alternative marketing channel for farmers living in areas where there are no processing companies.

- Set up small-scale post-harvest facilities for ripening, grading and storage in rural areas (or work with a firm such as Cold Store). The facilities can be extended to include simple processing equipment to produce products such as dried fruit and cut fruit, which will further add value to the products.
- Give training on farming practices and harvesting to produce quality products.

- Give training on post-harvest handling (ripening, grading and packing) to farmers (individuals or groups)
- Give training on marketing to find markets or customers who will buy these products at higher prices, and to manage the relationship with customers (domestic and international).
- Build public awareness on the danger of ripening using calcium carbide.
- Develop capacity of relevant government departments.

#### i) Required experts

In order to implement the above project, the following experts will be required.

- Strategic plan development/Institutional development
- Cultivation/Farm management
- Marketing
- Community development

#### ii) Required inputs

In order to implement the above project, the following inputs will be required.

- Seed, necessary material for cultivation including irrigation facility if required
- Crates if required

## 6.4 Priority state 3: Odisha<sup>89</sup>

### (1) Direction of assistance

As described in 5.4, the agriculture sector in Odisha contributes only 16 percent to GSDP, while more than 60 percent of the population are employed in the sector. This figure suggests low productivity of the production and marketing system in the sector. In order to approach issues relating to AVCs in Odisha, the Study team concluded that the state needs a different approach to assistance - the situation is very different to AP and Telangana; however the basic concept of motivating farmers and establishing linkages with markets remains the same. Assistance to Odisha needs to focus more on the basic capacities of relevant stakeholders.

The most distinctive bottleneck of Odisha compared to AP and Telangana is lack of basic infrastructure supporting value chains – such as post-harvest and market facilities, and farm access roads. Apart from some small-scale cashew processing units operating in Koraput District, there is virtually no agro processing unit in the state. The unorganized market system that prevails in the state is also a major challenge. Markets

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<sup>89</sup> As indicated in 5.1 (4), description of this section is not as detailed as that of AP since the additional survey (third field survey) was conducted only in AP.

in the state are regulated by RMCs, but regulation is slack. Each market is under different ownership and management, with no permanent cadre of market secretaries and a lack of proper market information. This situation tends to lead to farmers being exploited.

On the other hand, the state has a huge potential for developing its food industry due to its suitable agro-climatic conditions. The volume of horticulture crops produced is one of the highest in India, and it is expected to increase further in years to come as the state promotes plantation schemes; however crop productivity is relatively low compared to other states. Mango in Odisha, for example, has a great comparative advantage due to certain varieties like Dasherri and Langrage maturing in mid-May when the crop of major producing states like UP and AP is not available. Likewise, hilly areas like Rayagada have an advantage in the market, as mango ripens after July due to the cooler climate. Another strength of crops in the state is that in many places they are naturally organic, and this has high demand in the high-end and international markets.

Bearing these observations in mind, the Study team proposes below a series of interventions that focus on providing farmers with alternative market channels to replace the current unorganized traditional market system, by upgrading the basic capacity of stakeholders.

Table 6-4: Project proposal for Odisha

Category	Proposed program/projects
Comprehensive program	Comprehensive food sector development based on master plan (all potential crops)
Independent projects/ pilot projects in comprehensive program	(1) Link farmers to markets through supporting development of societies (such as replication of KASAM model)
	(2) Promote marketability of mango (table varieties) by supporting post-harvest and primary processing activities in rural areas
	(3) Promote export of cashew and other potential crops to international market by supporting production techniques, organic certification, building linkages and upgrading existing facilities

**(2) Project proposal**

**1) Comprehensive program: comprehensive food sector development based on master plan**

**a) Outline of program**

Similar to the proposed programs for Telangana, it is proposed to assist the government in Odisha to formulate a masterplan containing some pilot projects for developing the food sector. It might be particularly effective in Odisha to draw a comprehensive map of all related practices and activities, and sort

out information for sound strategy development, as direct linkages between farmers and markets are weak, and the market system is complex and highly fragmented. The main activities to be conducted in the comprehensive program are listed below.

- i) Study and map farmers' cultivation patterns and production capacity, existing farmer associations and their activities, existing post-harvest facilities, and the existing marketing and distribution system for potential crops.
- ii) Market study for food products utilizing potential crops.
- iii) Formulate a draft plan to develop the food sector in Odisha.
  - Plan to improve productivity and quality of crop production
  - Plan to improve or upgrade post-harvest facilities
  - Plan to enhance or replicate activities of existing farmer organizations for crop marketing
  - Plan to develop primary processing capacity of potential crops at farm level
  - Plan to expand market linkages and attract investment for food processing
  - Assess needs for improving the agricultural marketing system
  - Assess needs for transport infrastructure (such as farm access roads)
  - Guidelines for upgrading and standardizing food processing operations such as contract farming, handling materials, food safety and quality control
- iv) Implement pilot projects based on the above plan.
- v) Revise and finalize the plan based on the outcome of pilot projects.

As in Telangana, since there are few processing units operating in the state the plan should include a strategy for attracting investment for food processing, and matching farmers with processing companies outside the state.

### **b) Required experts**

In order to implement the above project, the following experts will be required.

- Strategic plan development/Institutional development
- Cultivation/Farm management
- Marketing/Extension
- Food processing/5S/Kaizen
- Infrastructure (main road/community road)

### **c) Required inputs**

In order to implement the above project, the following inputs will be required.

- Seed, necessary material for cultivation including irrigation facility if required
- Crates if required
- Road construction if required

## **2) Independent projects/pilot projects**

### **a) Link farmers to markets through supporting development of societies (such as replication of KASAM model)**

In Odisha some successful cases of farmer associations can be seen, such as KASAM<sup>90</sup> mentioned in 5.4.4. KASAM organizes 12,000 farmers to conduct collective cultivation and post-harvest management, and provides farmers with linkages to overseas markets. This initiative brings profit to farmers through direct marketing of their products. Despite some on-going promising initiatives, this kind of activity needs some back-up for further extension, as most organizations lack finance, human resource capacity, knowledge and technology. Therefore the project aims to support replication of existing successful models that provide alternative market channels for farmers through the below interventions.

- Support government and relevant stakeholders to organize farmer associations through learning from the experience of existing successful cases like KASAM
- Provide training to farmers for improving productivity and good agricultural practice (GAP)
- Provide support to existing farmer associations to upgrade their post-harvest facilities
- Provide training and necessary support to existing farmer associations for market linkages
- Develop capacity of relevant government departments
- Disseminate the model to other areas.

Similar to the proposed pilot projects in AP and Telangana, in order to ensure effective project implementation target associations should be chosen based on proposals submitted by prospective farmer associations, as their motivation and awareness is key for success.

#### **i) Required experts**

In order to implement the above project, the following experts will be required.

- Strategic plan development/Institutional development
- Cultivation/Farm management
- Marketing/Extension

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<sup>90</sup> According to the information provided by the Horticulture Department, a farmers' association called 'Odisha Rural Development and Marketing Society' (ORMAS) was set up by the government to promote rural products by supporting Self-Help Groups (SHGs). It has successfully marketed vegetables by direct sales to Reliance Fresh Ltd., which has a number of supermarket outlets over the country.

- Community development
- Food processing/5S/Kaizen

ii) Required inputs

In order to implement the above project, the following inputs will be required.

- Seed, necessary material for cultivation including irrigation facility if required

**b) Promote marketability of mango (table varieties) by supporting post-harvest and primary processing activities in rural areas**

Odisha will produce a huge volume of mango in the next two to three years due to the on-going plantation scheme, but no specific marketing plan has been included in the scheme. Mango produced in the state has a comparative advantage for marketing if proper handling is introduced. Based on field observation, this project is proposing to increase value addition at village level by promoting post-harvest and processing activities. This project does not involve processing companies but to test some new processing activities that can be carried at the rural level, such as producing dried mango.

- Set up small-scale post-harvest facilities for hot water treatment, ripening and grading mango in rural areas
- Give training on farming practices (including water, pest and disease management) and harvesting to produce quality products
- Give training on post-harvest management (hot water treatment, ripening and grading, etc.) to farmers (individuals or groups)
- Give training on marketing to find markets or customers who will buy these products at higher prices and to manage relationships with customers (domestic and international)
- Develop capacity of relevant government departments.

i) Required experts

In order to implement the above project, the following experts will be required.

- ž Strategic plan development/Institutional development
- ž Cultivation/Farm management
- ž Marketing
- ž Community development

ii) Required infrastructure and inputs

In order to implement the above project, the following inputs will be required.

- Small-scale post-harvest facilities such hot water treatment, ripening and grading mango in rural areas
- Seed, necessary material for cultivation including irrigation facility if required
- Crates if required

**c) Promote export of cashew and other potential crops to international markets by supporting production techniques, organic certification, building linkages and upgrading existing facilities**

The project aims to support external market linkages of farmers and the existing processing units of cashew and other potential crops, thereby strengthening linkages between farmers and processors as well as opportunities to increase farmers' income. As mentioned in 5.4.3, the cashew industry in the state has no direct reach to international markets even though the cashew available in the region is organic and good quality compared to competitors. As this is due to lack of farm productivity, low technology and many other reasons, the project will attempt to remove these bottlenecks with the following activities.

- Support farmers and other relevant institutions with new plantation to replace old trees
- Give training on farming practice and harvesting to produce quality products
- Promote linkages between farmers and international markets by helping farmers to get organic and/or Fairtrade certificates
- Give training to processing industry for quality control system and safety standards to increase productivity
- Give training to cashew processors on marketing to find markets or customers in export markets, and to manage relationships with customers
- Support processors and workers to adopt the required practices to sell in international markets, including obtaining international standards and certification.
- Develop capacity of relevant government departments.

The horticulture department mentioned in the survey that the state government developed an organization called Dhenkanal Fruits and Vegetable Marketing Company Ltd. to facilitate marketing of horticultural crops. The cost of the project is INR0.1 billion, with post-harvest facilities such as ripening chambers, cold storage, grading lines and some processing facilities. The Directorate of Horticulture organized ten FPOs in neighboring areas to set up backward linkages, but forward linkages have yet to be established. Since this company is located in the center of coverage of Lengali irrigation project, the activities of the project could be extended to this company to enhance its marketing capacity.

i) Required experts

In order to implement the above project, the following experts will be required.

- ž Strategic plan development/Institutional development
- ž Cultivation/Farm management
- ž Marketing
- ž Processing/quality management

ii) Required infrastructure and inputs

In order to implement the above project, the following inputs will be required.

- Seedling, necessary material for cultivation including irrigation facility if required

## ANNEX

### ANNEX 1: Information summary of stakeholders

#### <GOVERNMENT>

The state government organizations concerned to AVC and the Study are listed below and these are visited during the 1<sup>st</sup> and 2<sup>nd</sup> field survey.

Ministry	Department	Division
Ministry of Agriculture	Department of Agriculture and Cooperation (DAC)	Among 27 divisions under DAC, below are concerned. -Agriculture Marketing -Horticulture -International Cooperation -Rashtriya Krishi Vikas Yojana (RKVY)
		National Horticulture Board (NHB)
		Coconut Development Board (CDB)
		Department of Agriculture Research and Education (DARE)
	Department of Animal Husbandry, Dairy and Fisheries (AH&D)	Among 6 divisions under AH &D, below 2 are concerned -Animal Husbandry -Dairy Development
		Delhi Milk Scheme
		National Dairy Development Board (NDDB)
	National Institute of Agricultural Marketing (NIAM)	
	National Cooperative Development Corporation (NCDC)	
	National Center for Cold chain Development (NCCD)	
Ministry of Food Processing Industries (MOFPI)	National Institute of Food Technology Entrepreneurship and Management (NIFTEM)	
	Indian Grape Processing Board (IGPB)	
	Indian Institute of Crop Processing Technology (IICPT)	
	National Meat and Poultry Processing Board (NMPPB)	
Ministry of Commerce and Industry	Agricultural & Processed Food Products Export Development Authority (APEDA)	
Ministry of Consumers Affairs, Food and Public Distribution	Department of Consumer Affairs	
	Department of Food and Public Distribution	
Ministry of Rural Development	Department of Rural Development	
	Department of Land Resources	

#### 1. Department of Agriculture and Cooperation (DAC)

The mission of the department is to enhance productivity and production of agricultural commodities to ensure the food nutritional and livelihood security of the nation and also to make agriculture a sustainable

and viable vocation for livelihood support by 2020.

Objectives of the department are as follows;

- (1) Increasing Crop production and Productivity thereby ensuring food security and enhanced income level to farmers
- (2) Incentivizing states to enhance public investment in agriculture & allied sectors
- (3) Diversification in agriculture for increased income generation
- (4) Ensuring supply of agricultural inputs for enhanced production and productivity
- (5) Plant Protection, Quarantine and Residue Management
- (6) Dissemination of technology / information to farmers
- (7) Enhancing Soil health and promotion of resource conservation technology for sustainable agriculture
- (8) Improving credit flow, market infrastructure, and risk mitigation
- (9) Maintaining agricultural statistics to aid policy development
- (10) Drought Preparedness and Grant of relief under State Disaster Response Fund (SDRF) /National Disaster Response Fund (NDRF)
- (11) Encouraging private investment in agriculture through PPP mode

<Scheme/Program under the department>

- National Mission for Sustainable Agriculture (NMSA)

National Mission for Sustainable Agriculture (NMSA) is a major new mission that launches during the Twelfth Plan. This aims at transforming Indian agriculture into a climate-resilient production system through adoption and mitigation of appropriate measures in the domains of both crops and animal husbandry. Since a number of activities relating to sustainable agriculture are already parts of other proposed missions, NMSA as a programmatic intervention, will primarily focus on synergizing resource conservation, improved farm practices and integrated farming for enhancing agricultural productivity.

- National Food Security Mission (NFSM)

The National Food Security Mission (NFSM) is presently under implementation in 482 districts of 19 states of the country with a view to enhance the production of Rice, Wheat and Pulses through area expansion and productivity enhancement; restoring soil fertility and productivity; creating employment opportunities; and enhancing farm level economy to restore confidence of farmers. The basic strategy of the mission is to promote and extend improved technologies i.e., seed, micronutrients, soil amendments, Integrated Pest Management, Farm Machinery and resource conservation technologies along with capacity building of farmers with effective monitoring and better management in the high potential districts in order to bridge the yield gaps. Implementation of Mission in the 11th Plan has not only achieved the targeted food grains

production but has also widened the base of food grains production with significant contribution from low productivity Districts.

- **Rashtriya Krishi Vikas Yojana (RKVY)**

Rashtriya Krishi Vikas Yojana (RKVY) was launched in the Eleventh Plan against a backdrop of faltering agriculture growth in the previous decades. It was designed as a State Plan Scheme with complete flexibility to the states to choose projects specifically tailored to their conditions for generating growth in agriculture and allied sectors. RKVY has two strategic objectives - first, to encourage states to allocate more funds for agriculture and allied sectors and second, to incentivize states to generate additional growth in agriculture and allied sectors by better planning and undertaking appropriate growth oriented projects, as a result of which, states' allocation to agriculture and allied sectors rose from INR8,770 crore (4.88percent of total plan expenditure) in the base year of 2006/07, to INR29,413 crore (6.82percent of states total plan expenditure) in the year 2011/12 (RE). Increase in overall growth in agriculture and allied sectors during the 11th plan period is a testimony of the scheme's contribution to stimulating growth by capitalizing agriculture sector.

RKVY has greater acceptance among states as it provides flexibility to formulate state-specific strategies. However, RKVY has not effectively addressed specific issues arising out of substantial and growing share (about 83percent) of small and marginal land holdings in the country. Small land holdings create adverse economies of scale necessitating aggregation of farm produces through appropriate institutional linkages at remunerative rates, integrating agricultural marketing value chain and creation of post-harvest & storage facilities. While, fast growing sectors like animal husbandry, dairying & fisheries (19percent), micro irrigation (15percent) and horticulture (9percent) would account for 43percent of total 11<sup>th</sup> Plan outlay under RKVY, allocation in marketing, post-harvest management & cooperatives remained a mere 6percent during the same period. Further, drawbacks were noticed in lack of effective monitoring & evaluation of the projects, weak linkages with Comprehensive District Agriculture Plans (C-DAPs) and State Agriculture Plans (SAPs).

RKVY model has received tremendous response from the states and for the 12<sup>th</sup> Plan period, an allocation of INR63,246 crore has been made for RKVY which is nearly 50percent of the total allocation of Department of Agriculture. This in itself is a pointer towards the importance that Government of India (GoI) attaches to RKVY.

### **1.1 Agriculture Marketing Division**

The division is responsible for facilitating marketing of agricultural products. It also issues the Model APMC Act and supervise the reform process of each state.

<Scheme/Program under the division>

- Rural Godown Schemes(RGS)/Grammin Bhandaran Yojana(GBY)

The scheme was started from 1st April 2001. The main objectives of the scheme are to meet the requirements of farmers for storing farm produce, processed farm produce, consumer articles and agricultural inputs, promotion of grading, standardization and quality control of agricultural produce to improve their marketability, prevention of distress sale immediately after harvest by providing the facility of pledge financing and marketing credit, and to strengthen agricultural marketing infrastructure by paving the way for introduction of a national system of warehouse receipts in respect of agricultural commodities stored in such godowns and to reverse the declining trend of investment in agriculture sector by encouraging private and cooperative sector to invest in the creation of storage infrastructure in the country.

The scheme of Rural Godowns has been formulated for creation of scientific storage capacity with allied facilities in rural areas by encouraging private and cooperative sector to invest in the creation of storage infrastructure in the country. Under the scheme, 25percent back-ended subsidy (33.3percent in case of NE states, Tribal & Hilly areas and SC/ST) on the total project costs is being provided for the purpose. The eligible promoters for construction of rural godowns are individual farmers, group of farmers/ growers, partnership/ proprietary firms, NGO, companies, corporations, cooperatives, Agricultural Produce Marketing Committees, Marketing Boards and Agro Processing Corporations.

As on 31st January 2013, there are 30,574 godown projects have been sanctioned and a storage capacity of 38.36million tonnes was created under the scheme. An amount of INR1,017.32crores of subsidy has been released to various banks and Cooperatives through NABARD and NCDC.

- Strengthening/Development of Agricultural Marketing Infrastructure, Grading & Standardization (AMIGS)

With a view to induce large investment in the development of marketing infrastructure, the Ministry has formulated a scheme for “Development/Strengthening of Agricultural Marketing Infrastructure, Grading and Standardization” during 2004. Under this scheme investment subsidy is provided on the capital cost of general or commodity specific infrastructure for marketing of agricultural commodities and for strengthening and modernization of existing agricultural markets, wholesale, rural and periodic or in tribal areas. The scheme is reform linked, to be implemented in those states/UTs that amend the APMC Act wherever required to allow setting up of agricultural markets in private and cooperative sectors. Under the scheme, back ended subsidy @ 25percent of capital cost of the project is provided in all states and @ 33.3percent of capital cost in case of NE states, hilly areas and SC/ST entrepreneurs. In respect of infrastructure projects of state agencies, there is no upper ceiling on subsidy to be provided under the scheme.

Agricultural Marketing being the state subject the Directorate has only an advisory role so far as

improvement/development of marketing system is concerned. In the field of grading and quality assurance also, Directorate endeavors to involve state authorities more and more to make it consumer/public oriented. Being a central coordinating organization, Directorate is actively associated with the development in agricultural marketing in both state and National level by introducing various reform initiatives of Government of India.

Since Inception of the scheme up to 31-12-2012, a total number of 8,087 marketing Infrastructure projects have been sanctioned and subsidy of INR782.14 crores has been released.

### **1.2 National Horticulture Board (NHB)**

It was set up by the Government of India in 1984 as an autonomous society under the supervision of DAC. The main aims of the Board include;

- Development of hi-tech commercial horticulture
- Development of modern post-harvest management infrastructure
- Popularization of identified new technologies
- Promotion and market development of fresh horticulture produce,
- Strengthen market intelligence system
- Carrying out studies and surveys to identify constraints and develop short

<http://nhb.gov.in/about.html>

### **1.3 Coconut Development Board (CDB)**

It is a statutory body established under the DOA or the integrated development of coconut cultivation and industry in the country with focus on productivity increase and product diversification. Its headquarters is located at Kochi in Kerala and Regional Offices are located at Bangalore in Karnataka, Chennai in Tamil Nadu and Guwahati in Assam.

<http://coconutboard.nic.in/cdb.htm#functions>

## **2. Department of Agriculture Research and Education (DARE)**

It was established in the Ministry of Agriculture in December, 1973 and coordinates and promotes agricultural research & education in the country. It has the following two autonomous bodies under its administrative control:

- Indian Council of Agricultural Research (ICAR)
- Central Agricultural University (CAU), Impale
- DARE is the nodal agency for International Cooperation in the area of agricultural research and education in India. The Department liaises with foreign governments, UN, CGIAR and other multilateral agencies for cooperation in various areas of agricultural research. The major functions of

DARE is;

- To look after all aspects of the agricultural research and Education (including horticulture, natural resources management, agriculture engineering, agricultural extension, animal science, economic statistics and marketing and fisheries) involving coordination between the central and state agencies.
- To attend all matters relating to Indian Council of Agricultural Research.
- To attend all matters concerning the development of new technology in agriculture, horticulture, natural resources management, agriculture engineering, agricultural extension, animal science, economic statistics and marketing and fisheries, including such functions as plant and animal introduction and exploration and soil and land use survey and planning.
- International co-operation in the field of agricultural research and education including relations with foreign and international agricultural research and educational institutions and organizations, including participation in international conferences, associations and other bodies dealing with agricultural research and education and follow-up decisions at such international conferences etc.
- Fundamental, applied and operational research and higher education including co-ordination of such research and higher education in agriculture including agro forestry, animal husbandry, dairying, fisheries, agricultural statistics, economics and marketing.

## **2.1 Indian Council of Agricultural Research (ICAR)**

It is an autonomous organization under DARE, established on 16 July 1929. It has its headquarters at New Delhi. The Council is the apex body for coordinating, guiding and managing research and education in agriculture including horticulture, fisheries and animal sciences in the entire country. With 99 ICAR institutes and 65 agricultural universities spread across the country this is one of the largest national agricultural systems in the world.

The ICAR has played a pioneering role in ushering Green Revolution and subsequent developments in agriculture in India through its research and technology development that has enabled the country to increase the production of food grains by 4 times, horticultural crops by 6 times, fish by 9 times (marine 5 times and inland 17 times), milk 6 times and eggs 27 times since 1950-51, thus making a visible impact on the national food and nutritional security. It has played a major role in promoting excellence in higher education in agriculture. It is engaged in cutting edge areas of science and technology development and its scientists are internationally acknowledged in their fields.

### **2.1.1 Indian Institute of Horticultural Research (IIHR)**

It is an autonomous organization acting as a nodal agency for basic, strategic, anticipatory and applied research on various aspects of horticulture in India. The institute has its headquarters in Bengaluru, and is a

subsidiary of Indian Council of Agricultural Research (ICAR), New Delhi, under the Ministry of Agriculture, India.

<http://www.iihr.ernet.in/>

### **3. Department of Animal Husbandry, Dairy and Fisheries (AH&D)**

It is based in Delhi and responsible for matters relating to livestock production, preservation, protection and improvement of stocks, dairy development, matters related to the Delhi Milk Scheme and the National Dairy Development Board. The Department provides advises to the state government and Union Territories in the formulation of policies and programs in the field of animal husbandry, dairy development and fisheries. The Department looks after the administration of the following subordinate offices spread all over the country.

<http://dahd.nic.in/dahd/about-us.aspx>

#### **3.1 Delhi Milk Scheme (DMS)**

It is based in Delhi, is a subordinate office of AH&D. It was set up in 1959 with the primary objective of supplying wholesome milk to the citizens of Delhi at reasonable prices as well as or providing remunerative price to milk producers. Initially DMS had 2.55 lakh liters of milk per day. However in order to meet increasing demand of milk in the city, the capacity was expanded in phases to the level of 5.00 lakh liters of milk per day.

<http://dms.gov.in/>

### **4. National Dairy Development Board (NDDB)**

NDDB was established under the NDDB Act 1987 by merging with Indian Dairy Corporation in 1987. It is an independent body and based in Anand, Gujarat. It was created to promote, finance and support producer-owned and controlled organizations. NDDB's programs and activities seek to strengthen farmer cooperative and support national policy that are favorable to the growth of such institutions. Fundamental to NDDB's efforts are cooperative principles and cooperative strategies.

<http://www.nddb.org/>

### **5. National Institute of Agricultural Marketing (NIAM)**

It is a premier national level institute set up by the Ministry of Agriculture, of India to cater to the needs of agricultural marketing personnel in India and South East Asian countries. This institution provides training to various level functionaries in the field of agricultural marketing. Agricultural marketing research and consultancy are also its main activities. The institute is located in Jaipur.

<http://www.ccsniam.gov.in/>

## **6. National Cooperative Development Corporation (NCDC)**

It was established by an Act of Parliament in 1963 as a statutory Corporation under Ministry of Agriculture. Currently it has eighteen Regional Directorates. Its mission is to provide financial assistance to Cooperative including to those from the weaker sections, for infrastructure and business development, for their economic upliftment, along with, appropriate capacity building interventions.

<http://www.ncdc.in/>

## **7. National Centre for Cold Chain Development (NCCD)**

It is based in Delhi, has been established by Ministry of Agriculture to promote and develop integrated cold chain in India for perishable agriculture and horticulture produce including perishable from allied sectors. The main objectives of the center are to recommend standards and protocols for cold chain infrastructure, suggest guidelines for human resource development and to recommend appropriate policy frame-work for development of cold chain. NCCD is mandated to prescribe technical standards for cold chain infrastructures for perishable food items including fresh fruits & vegetables and undertake their periodic revision keeping pace with technological advancements.

<http://www.nccd.gov.in/>

## **8. National Institute of Food Technology Entrepreneurship and Corporation (NIFTEM)**

It is a newly established public institution for research, education and catering the need of various stakeholders, entrepreneurs, food processing industry, exporters, policy makers and government policy. The NIFTEM is being set up by MOFPI.

The vision for NIFTEM is to set up an International center of excellence which integrates technological, managerial and behavioral aspects of the Indian food processing industry.

[http://www.niftem.ac.in/site/niftem\\_home.aspx](http://www.niftem.ac.in/site/niftem_home.aspx)

## **9. National Meat and Poultry Processing Board (NMPPB)**

It is an autonomous organization under Ministry of Food Processing Industries. It would initially be funded by the Government of India for two years and would be managed by the industry itself. The Board will have 19 Members including CEO of the Board.

## **9. Agriculture and Processed Food Products Export Development Authority (APEDA)**

It was established by the Government of India under the Agricultural and Processed Food Products Export Development Authority Act. The main functions of the Authority are as follows;

- Development of industries relating to the scheduled products for export by way of providing financial assistance or otherwise for undertaking surveys and feasibility studies.

- Registration of persons as exporters of the scheduled products
- Fixing of standards and specifications for the scheduled products for the purpose of exports;

<http://www.apeda.gov.in/apedawebsite/index.asp>

### **11. Department of Consumer Affairs**

It is responsible for the formulation of policies for Consumer Cooperatives, Monitoring Prices, and Consumer Movement in the country and Controlling of statutory bodies like Bureau of Indian Standards (BIS) and Weights and Measures. The major tasks are as follows;

- Enhancement of awareness of consumers about their rights and responsibilities
- Provision of effective, inexpensive and speedy redressal system to consumers
- To augment infrastructure of enforcement machinery of Legal Metrology Department of states/UTs and implementation of the Legal Metrology Act, 2009
- Strengthening of National Test House (NTH) laboratories
- Efficient Regulation of Commodity Futures Markets
- Strengthening of Forward Markets and Forward Markets Commission
- Formulate Standards and strengthen Conformity Assessment of Products and Services
- To promote and protect the interests of consumers through various Schemes
- Completion of an independent evaluation of NTH Lab
- Implementation and regulation of Essential Commodities Act
- Monitoring of prices of Essential Commodities

### **12. Department of Food and Public Distribution (DFPB)**

The department's responsibility is to ensure food security for the country through timely and efficient procurement and distribution of food grains. This involves procurement of various food grains, building up and maintenance of food stocks, their storage, movement and delivery to the distributing agencies and monitoring of production, stock and price levels of food grains. The focus is on incentivizing farmers through fair value of their produce by way of Minimum Support Price mechanism, distribution of food grains to Below Poverty Line (BPL) families and covering poor households at the risk of hunger under Antyodaya Anna Yojana (AAY), establishing grain banks in food scarce areas and involvement of Panchayat Raj Institutions in Public Distribution System (PDS).

The Department is also responsible for formulation of policies concerning the sugar sector such as fixing of Fair and Remunerative Price (FRP) of sugarcane payable by Sugar factories, development and regulation of sugar industry (including training in sugar technology), fixation of levy price of sugar and its supply for PDS and regulation of supply of free sale sugar. The Department also formulates policies on export and import of food grains, sugar and edible oils.

<Scheme/Program under the department>

- **Private Entrepreneur Guarantee (PEG) Scheme**

The scheme launched in 2008 is for augmenting the storage capacity in the form of covered godowns and to reduce the dependence on CAP storage. Under the PEG Scheme, godowns are constructed in PPP mode through private parties, as well as various agencies in Public Sector for guaranteed hiring by FCI. Locations for construction of godowns were identified by the FCI on the basis of recommendations of State Level Committees (SLCs) to meet the storage gaps.

As of June 2014, capacity of 153.16 lakh MT has been sanctioned for construction and 120.30 lakh MT has been completed.

## <ASSOCIATIONS>

### **1. National Agricultural Cooperation Marketing Federation of India (NAFED)**

It was established on the auspicious day of Gandhi Jayanti on 2nd October 1958 under the Multi State Co-operative Societies Act. Nafed was setup with the object to promote Co-operative marketing of Agricultural Produce to benefit the farmers. Agricultural farmers are the main members of Nafed, who have the authority to say in the form of members of the General Body in the working of Nafed.

<http://www.nafed-india.com/home.asp>

### **2. All India Food Processors Association (AIFPA)**

It was established in 1943. The members are food processors in India, involved in the processing of fruits and vegetables, meat and fish; milk and milk products, and also the manufacturers of biscuit and confectionery products, ready-to-serve beverage and ethnic delicacies etc. Member industries account for a large percentage of the total production and exports of this industry in India. Its main office is located in New Delhi.

<http://www.aifpa.net/>

### **3. Agricultural Technology Marketing Agency (ATMA)**

It is increasingly responsible for all the technology dissemination activities at the district level. It would have linkage with all the line departments, research organizations, non-governmental organizations and agencies associated with agricultural development in the district.

### **4. National Seed Association of India (NSAI)**

It is aimed to be established to encourage investment in the state of the art R & D to bring to the Indian farmer superior genetics and technologies, which are high performance and adopted to a wide range of agro-climatic

zones.

<http://nsai.co.in/index>

#### **5. Federation of coconut farmers in Kerala (KERAFED)**

It is the Apex Co-operative Federation of coconut farmers in Kerala and is the largest producer of coconut oil in India. KERAFED's coconut oil complex at Karunagapally in Kollam district is one of the biggest such units in India, with a capacity of 200 Tons per day.

<http://www.kerafed.com/>

#### **6. India Dairy Association**

It is based in Delhi, was established in 1948, Indian Dairy Association (IDA) is the apex body of the dairy industry in India. The members are from the cooperatives, MNCs, corporate bodies, private institutions, educational institutions, government and public sector units. IDA functions very closely with the dairy producers, professionals & planners, scientists & educationists, institutions and organizations associated with the development of dairying in India.

<http://www.indairyasso.org/>

#### **7. National Cooperative Dairy Federation of India (NCDFI)**

It is based in Anand, Gujarat, is the apex organization for the cooperative dairy sector. Its members include federal dairy cooperatives of states and union territories. Primary objective of NCDFI is to facilitate the working of dairy cooperatives through coordination, networking and advocacy. Important activities of NCDFI includes; coordinating sale of milk and milk products of its members to the Ministry of Defense and other para-military organizations, and marketing of frozen semen doses produced by Sabarmati Ashram Gaushala and Animal Breeding Centre.

<http://www.indiadairy.coop/>

#### **8. Gujarat Cooperative Milk Marketing Federation Ltd. (GCMMF)**

It is India's largest food product marketing organization with annual turnover (2013/14) USD 3.0 billion. Its daily milk procurement is approx. 13.18 million litter per day from 17,025 village milk cooperative societies, 17 member unions covering 31 districts, and 3.23 million milk producer member. The Amul Model of dairy development is a three-tiered structure with the dairy cooperative societies at the village level federated under a milk union at the district level and a federation of member unions at the state level.

<http://www.amul.com/>

## **9. Gujarat Progressive Dairy Farmers Association**

It is a leading organization associated with the dairy industry of Gujarat. The organization is dedicated in the development of the sector and also helps the dairy farmers to learn about the sector and to develop their skills and ideas efficiently.

<http://10times.com/organizers/gujarat-progressive-dairy-farmers-association>

## **10. All India Meat & Livestock Exporters Association (AIMLEA)**

It was formed in 1972, is headquartered in South Mumbai and has over 60 active members. AIMLEA supports the efforts of the Agricultural & Processed Export Development Authority (APEDA) and the Ministry of Commerce, Government of India in the export of risk free, frozen/chilled Buffalo meat and sheep/goat meat from India

<http://www.meat-ims.org/groups/all-india-meat-livestock-exporters-association-aimlea/>

## **11. The Poultry Federation of India**

It is the voice of the Indian Poultry Industry, committed to its growth. Serving producers and processors of turkey, chicken, quail, squab and egg products, the PFI provides a united voice for the industry with government, media and the general public

<http://www.pfindia.org/>

## **<RESEARCH INSTITUTE>**

### **1. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)**

It is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. This is the executing institution of Agri-Business Incubation (ABI) Program. Its headquarters is located in Hyderabad.

<http://www.icrisat.org/>

### **2. The National Dairy Research Institute**

As country's premier Dairy Research institution, it has been developed considerable expertise over the last five decades in different areas of Dairy Production, Processing, Management and Human Resource Development.

<http://www.ndri.res.in/ndri/Design/aboutNDRI.html>

## **<INDUSTRY>**

### **1. Mother Dairy**

It is based in Noida, Uttar Pradesh, was set up in 1974 as a wholly owned company of the National Dairy Development Board, NDDB. Mother Dairy manufactures, markets and sells milk and milk products under the

Mother Dairy brand (Milk, Cultured Products, Ice Creams, Panir and Ghee), Dhara range of edible oils, Safal range of fresh Fruit & vegetables, Frozen Vegetables, Processed Fruit & Vegetable Products, Fruit Pulps & Concentrates in bulk aseptic packaging and fruit juices at a national level through its sales and distribution networks for marketing food items.

<http://www.motherdairy.com/>

## 2. The Allana Group

It is acknowledged as the world's largest exporter of frozen Halal Buffalo meat. The top of the group commands respect and admiration of his competitors and is the President of the All India Meat & Livestock Exporters Association (AIMLEA) in his seventh term.

<http://www.aiaims.com/ourpatrons.aspx>

## 3. Private companies

The major agricultural products (horticulture and dairy) manufacturers in India are listed in the below table.

Company Name	Brand	Major products
Dabur India Ltd.	Dabur, Real, Activ, Vatika, Pudim Hara	Juice, honey, spices, cooking pastes, coconut milk
Godrej Industries Ltd.	Godrej, Jumpin, Xs	Oils and vanaspati, bakery, fats, fruit drinks and fruit nectar.
Parel Agro Ltd.	LMN, Bailey, Appy, Frooti	Water, beverages, confectionery
MTR Foods	MTR	Ready to eat and frozen food, spices, dessert mix, pickle, papads, beverages
Nestle India	Nestle, Maggi, Nescafe	Chocolates, snack foods, milk, coffee, infant food
Pepsi Co.	Pepsi, Frito-lays	Carbonated drinks, juices, snack foods
Cadbury India Ltd.	Dairy Milk, Perk, Five star, Gems	Chocolates, Malt Food, Cocoa powder
Hindustan Unilever Ltd.	Brooke Bond, Annapurna, Kissan, Knor, Kquality Walls	Tea, coffee, biscuits, ice-creams, atta, instant drinks, soups, jams and squash and host of other FMCG products
Britannia Industries Ltd.	Britannia, Tiger, Bourbon, Goodday	Biscuits, flavored milk, dairy, whitener, ghee, bread, cheese,
Global Green	Tify	The firm is engaged in growing, manufacturing, distribution and selling of pickled cucumbers (gherkins, cornichons, pickles and relish), sweet-corn, silver skin onions, peppers (jalapeño and paprika), cherries, capers and mixed

<b>Company Name</b>	<b>Brand</b>	<b>Major products</b>
		vegetables.
Pagro Foods	Pagro, Fry Day	Frozen vegetables.
Temptation Foods	Ever Fresh, Delika , Karen Anand	Frozen fruits and vegetables
FieldFresh Foods	Del Monte	Deals with fresh fruits and vegetables and processed foods & beverages in the domestic as well as international markets
Namdhari's Fresh	Namdari's Fresh, NF, NP	Fresh vegetables and fruits.
Capricorn Food Products India Ltd.,	Capricorn	Tropical fruit pulp, purees and concentrates, bulk frozen, IQF fruits and vegetables and fruit juices.
Aakash Agritec	--	Fruit pulps, fruit juices, purees and concentrates
Aga Fruits (P) LTD	Agafruits	Fruits pulp and puree.
Agri Xpo Industries	--	Fruit pulp, fruit jams, fruit jellies, marmalade and ready to serve fruit juices, vegetable preparations.
Deccan Edibles Pvt. Ltd	Deccan Produce	Fresh fruits and fruits pulp and puree.
Nandan Agrotech Pvt. Ltd	Zing, Nandan	Canned fruits.
Sun Agro Links	Sun Agro	Fruits pulp and puree.
Nestle India Limited	Milkmaid, Cerelac, Lactogen, Milo, Everyday	Sweetened condensed milk, malted foods, milk powder and Dairy whitener
Milkfood Limited	Milkfood	Ghee, ice cream, and other milk products
SmithKline Beecham Limited	Horlicks, Maltova, Viva	Malted Milkfood, ghee, butter, powdered milk, milk fluid and other milk based baby foods.
Indodan Industries Limited	Indana	Condensed milk, skimmed milk powder, whole milk powder, dairy milk whitener, chilled and processed milk
Gujarat Co-operative milk Marketing Federation Limited	Amul	Butter, cheese and other milk products
H.J. Heinz Limited	Farex, Complian, Glactose, Bonniemix, Vitamilk	Infant Milkfood, malted Milkfood
Britannia	Milkman	Flavored milk, cheese, Milk Powder, Ghee
Cadbury	Bournvita	Malted food

<JAPANESE COMPANIES>

AVC related Japanese companies other than the trading houses which are currently operative in India are listed below.

<b>Company Name</b>	<b>Description</b>	<b>Location</b>
Yakult	Yakult-Danon India is established. Marketing Lactic beverage.	Delhi
Nisshin	Operating 3 factories for instant noodles	Bangalore
Ajinomoto/ Toyo suisan	Marketing amino seasoning and instant noodle	Bangalore
HIC-ABF Special Foods Private Ltd	Producing freeze dried shrimp	Kerala
Accelerated Freeze Dry Company	Producing freeze dried fruits, vegetables, seafood, herbal goods	Kerala
Sakata seeds	Marketing seedlings	Haryana
Kagome	Marketing vitamin added carrot nutritious food. Operating tomato processing factory in cooperation with Mitsui Co. Invest in a local seedling company in Bangalore.	Mumbai
J Oil mills	Marketing high value added oil	Mumbai
Nichirei logistics	Invest in Snowman (one of the largest local cold logistic company) with Mitsubishi Co.	Bangalore
Nippon Yusen	Related to Nimurana logistic hub project in Rajasthan	Mumbai
Satake	Marketing rice huller	Delhi
Yanmar	Marketing agriculture equipment in cooperation with Mitsui Co.	Delhi
Kubota	Marketing agriculture equipment in cooperation with Sumitomo Co	Chennai
Ishida India	Marketing food processing equipment	Gurgaon
Yamato Scale India	Marketing food processing equipment	Delhi
Major trading house	Mitsui, Mitsubishi, Sumitomo, Itochu, Marubeni, Sojitsu	Delhi

**ANNEX 2: Area-wise progress of Reform in APMC Act**

<b>State-wise Progress of Reforms in Agricultural Markets (APMC Act) as on 31.12.2012</b>		
<b>S.No.</b>	<b>Stage of Reforms</b>	<b>Name of States/ Union Territories</b>
1	States/ UTs where reforms to APMC Act has been done for Direct Marketing; Contract Farming and Markets in Private/ Coop Sectors	Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, Nagaland, Orissa, Rajasthan, Sikkim, Tripura and Uttarakhand .
2	States/ UTs where reforms to APMC Act has been done partially	<b>a) Direct Marketing:</b> NCT of Delhi, Chhattisgarh, Madhya Pradesh, Punjab (In Rule only not in Act) and Chandigarh (In Rule only not in Act) <b>b) Contract Farming:</b> Chhattisgarh, Madhya Pradesh, Haryana, Punjab ( Only waiver of market fee and in rule only) and Chandigarh ( Only waiver of market fee and in Rule only) <b>c) Private Market:</b> Punjab ( In Act only not in Rule and also not implemented ) and Chandigarh ( In Act only and not in Rule and also not implemented)
3	States/ UTs where there is no APMC Act and hence not requiring reforms	Bihar*, Kerala, Manipur, Andaman & Nicobar Islands, Dadra & Nagar Haveli, Daman & Diu, and Lakshadweep.
4	States/ UTs where APMC Act already provides for the reforms	Tamil Nadu
5	States/ UTs where reforms are not initiated	Meghalaya, J&K, West Bengal, Puducherry and Uttar Pradesh.

Area wise Progress of Market Reforms as per major areas identified in Model APMC ACT as on 31/12/2012		
Sl. No.	Area of Reforms	States adopted the suggested area of market reforms
1	Setting up of Special Markets and Special Commodity Market	Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Nagaland, Sikkim, Tamil Nadu, Tripura, Jharkhand, Mizoram and Uttarakhand
2	PPP in Market Extension activities of Market Committee	Andhra Pradesh, Himachal Pradesh, Karnataka, Mizoram, Nagaland and Sikkim.
3	To promote and encourage e-trading, Market Committee may establish regulatory system, create infrastructure and undertake other activities and steps needed thereto	Gujarat, H.P., Karnataka, Rajasthan, Nagaland, Sikkim, Goa and Maharashtra (under Rule 5 license granted to Commodity Exchanges registered under FMC), Uttarakhand and Haryana (On pilot basis).
4	Secretary to be Chief Executive Officer of Market Committee. CEO shall be appointed by the Market Committee from the panel maintained by the Director/Board which may include professionals from open market.	Nagaland, Sikkim
5	Contract Farming Sponsor shall register himself with the Marketing Committee or with a prescribed officer in such a manner as may be prescribed.	Andhra Pradesh, Arunachal Pradesh, Assam, Goa, Himachal Pradesh, Karnataka, Haryana, Maharashtra, Madhya Pradesh, Nagaland, Orissa, Rajasthan, Chhattisgarh, Sikkim, Tripura, Jharkhand*, Uttarakhand
6	The contract Farming Sponsor shall get the contract farming agreement recorded with the prescribed officer.	Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Gujarat, Goa, Karnataka, Haryana, Madhya Pradesh, Maharashtra, Nagaland, Orissa, Rajasthan, Sikkim, Tripura and Jharkhand*, Uttarakhand
7	No title, rights, ownership or possession shall be transferred or alienated or vest in the contract farming sponsor or his successor or his agent as a consequence arising out of contract farming agreement.	Arunachal Pradesh, Assam, Goa, Haryana, Maharashtra, Nagaland, Orissa, Rajasthan, Sikkim, Tripura and Jharkhand*, Andhra Pradesh, Karnataka, Uttarakhand
8	Dispute settlement mechanism	Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Gujarat, Goa, Karnataka, Haryana, Madhya Pradesh, Maharashtra, Nagaland, Orissa, Rajasthan, Sikkim, Tripura and Jharkhand*; Himachal Pradesh, Uttarakhand

**Area wise Progress of Market Reforms as per major areas identified in Model APMC ACT  
as on 31/12/2012**

Sl. No.	Area of Reforms	States adopted the suggested area of market reforms
9	Exemption of Market Fee on the sales to the contract farming sponsors taking place outside the market yard under the contract farming agreement	Arunachal Pradesh, Goa, Karnataka (Reduced by 30%), Maharashtra, Nagaland, Orissa, Rajasthan, Sikkim, Tripura and Punjab (exempted under the Rules) and Uttarakhand
10	Specification of model agreement for contract farming	Chhattisgarh, Gujarat, Goa (As may be prescribed), Karnataka (As may be prescribed, Maharashtra (Rules), Nagaland, Rajasthan, Sikkim, Tripura and Jharkhand*
11	Single point levy of market fee	Andhra Pradesh, Rajasthan, Chhattisgarh, Gujarat, Goa, Himachal Pradesh, Karnataka, Madhya Pradesh, Nagaland, Sikkim, UT of Chandigarh, Punjab, Mizoram, Jharkhand and Uttarakhand
12	Single registration/ license for trade / transaction in more than one market	Assam, Andhra Pradesh, Goa, Himachal Pradesh, Rajasthan, Maharashtra, Nagaland, Sikkim, and Jharkhand, Mizoram and Uttarakhand (single registration for trading in more than one market is not provided).
13	No commission agent shall act on behalf of agriculturist seller and no deduction to be made towards commission	Madhya Pradesh, Chhattisgarh, Nagaland and Sikkim
14	Establishment of private market yards/ private markets managed by a person other than a market committee.	Andhra Pradesh, Arunachal Pradesh, Assam, Gujarat, Goa, Himachal Pradesh, Karnataka, Maharashtra, Nagaland, Orissa (excluding for paddy / rice), Rajasthan, Sikkim, Tripura, Punjab (provided in Act not in Rules and also not implemented), UT of Chandigarh ( provided in Act not in Rules and also not implemented ), Jharkhand and Uttarakhand.
15	Establishment of farmers/ consumers market managed by a person other than a market committee (Direct sale by the producer)	Arunachal Pradesh, Assam, Gujarat, Goa, Himachal Pradesh, Karnataka, Maharashtra, Nagaland, Rajasthan, Sikkim, Tripura, Punjab (only by State Govt), UT of Chandigarh (only by State Govt.), Jharkhand and Uttarakhand

**Area wise Progress of Market Reforms as per major areas identified in Model APMC ACT  
as on 31/12/2012**

<b>Sl. No.</b>	<b>Area of Reforms</b>	<b>States adopted the suggested area of market reforms</b>
16	Establishment of private yards and direct purchase of agricultural produce from agriculturist (Direct Purchasing from producer)	Arunachal Pradesh, Assam, Chhattisgarh, Gujarat, Goa, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Nagaland, Rajasthan, Sikkim, Tripura, Punjab (only in Rule not in Act), UT of Chandigarh (only in Rule not in Act), Jharkhand and Uttarakhand , U.P. (Only for bulk purchase from agriculturist of Wheat and sarson through executive order time to time )
17	Power to grant exemption from market fee by the State Government	Andhra Pradesh, Chhattisgarh, Gujarat, Goa, Madhya Pradesh, Maharashtra, Nagaland and Sikkim, Himachal Pradesh and Uttarakhand.
18	Setting up of separate Market Extension Cell in the Board, establishment of State Agricultural Produce Marketing Standard Bureau	Nagaland, Sikkim and Karnataka
19	Exemption of market fee on Fruits and Vegetable- Reform not concerned with Model Act, 2003	Madhya Pradesh, Chhattisgarh (Not notified Commodity), West Bengal (Partial).

### ANNEX 3: List of Donor Project related to AVC

World Bank		
National Rural Livelihoods project	July 2011~	Development of platform for improve livelihood, access to finance and services in rural areas.
Rajasthan Rural Livelihoods Project (RRLP)	Jan 2011~	Promote access to economic opportunity and empowerment of rural poor.
Tamil Nadu Empowerment and Poverty Reduction	July 2005~	
Rajasthan Agricultural Competitiveness Project	March 2012~	Enhancement of irrigation and agro value chain
National Dairy support project	Mar 2012~2018	Enhancement of production efficiency, milk collecting system in 14 target states.
Assam Agricultural Competitiveness Project	Mar 2012~	Improve productivity and market access of SME
West Bengal Accelerated Development of Minor Irrigation	Oct 2011~2017	Empower community based organizations, upgrade productivity of agriculture, horticulture, fisheries and irrigation.
Maharashtra Agricultural Competitiveness Project	August 2010~	Enhancement of irrigation and agro value chain
Andhra Pradesh Road Sector Project	Oct 2009~	(It is included in the list as it is in AP)
Andhra Pradesh Rural Water Supply and Sanitation	Sep 2009~	
Andhra Pradesh Community Based Tank Management Project	Apr 2007~	
ADB		
Horticulture Cold Chain Project	Aug 2013~	Private loan to Champion Agro Limited (Gujarat)
Agribusiness Infrastructure Development Investment Program	Dec 2011~	Investment in facility necessary for cold chain in Maharashtra
Advanced Project Preparedness for Poverty Reduction Institutional Development for a Value Chain Approach to Agribusiness in Bihar and Maharashtra	2010~	Enhancement of value chain of high value crops
UNIDO		
Industrial Cluster Development	1996~2001	Develop competitiveness of SME (garment, food processing) through cluster approach
GIZ		
SME Financing and Development	2006~2014	
Rural Financial System Development Program	2009~2013	Capacity building of NABARD in collaboration with ADB, WB
Promotion of Industrial Services and Employment		
EU		
Trade and Investment Development Program	2003~	Capacity building of food inspection institute to match EU standard

#### ANNEX 4: List of Reference Materials

ENGLISH		
Building competitiveness in Africa's agriculture: A guide to value chain concepts and applications	Webber, C. M., and P. Labaste	2010
Twelfth Five Year Plan	Planning Commission	2012
Food Safety Standard Law	Min of Health and Family Welfare	2011
APMC Act in India: Rising Food Inflation a Decade Story	Institute of Management, Delhi	2013
Annual Report 2011-2012	Min of Food Processing Industries	2011
Consolidated FDI Policy	Min of Commerce and Industry	2014
Report of the Working Group on Agricultural Marketing Infrastructure, secondary agriculture and policy required for internal and external trade	Planning Commission	2011
National Livestock Policy	Department of Animal Husbandry, Dairying & Fisheries	2013
Including provision for cold storages for more efficient distribution of farm produce	Planning Commission	2012
Key Indicators of Household Consumer Expenditure in India	National Sample Survey Office	2013
Household Consumption of Various Goods and Services in India	National Sample Survey Office	2014
Economic Survey 2013-14	Min of Finance	2013
Winning in India's retail sector	PWC	2011
Food Processing Industry in India	ONICRA	
Analysis of Pro-poor Agriculture value chains in Maharashtra: Preliminary findings	Indira Gandhi Institute of Development Research	
Enhancing competitiveness of Indian food chain	KPMG	2013
The agricultural and food value chain: entering a new era of cooperation	KPMG	2013
Marketing of Fruits and Vegetables in India: A Study Covering the Ahmedabad, Chennai and Kolkata Market	Vasant P. Gandhi, N.V. Namboodiri	
Taking Agriculture to the Market	World Bank	2008
Agricultural Outlook and situation analysis reports	National Council of Applied Economic Research	2012
Annual Report 2011-12	Department of Agriculture and Cooperation	2011
Indian Horticulture Database 2013	National Horticulture Board	2013
State of Indian Agriculture 2012-13	Department of Agriculture and Cooperation	2013
Status of agricultural Development in Eastern India	B.P. Bhatt, A.K. Sikka, Joydeep Mukherjee, Adul Islam, A.Dey	2012
19 <sup>th</sup> Livestock census 2012	Min of Agriculture, AH&D	2012
The Poultry industry in India	FAO	
Milk availability trends in production and demand and medium-term outlook	FAO	2012
Dairy and Products Annual 2013	US Department of Agriculture	2013
Annual Report 2013-14	Department of Animal Husbandry, Dairying & Fisheries	2014
Basic Animal Husbandry & Fisheries statistics	Department of Animal Husbandry, Dairying & Fisheries	2013
Annual Report 2012-13	National Dairy Development Board	2013
National Dairy Plan	National Dairy Development Board	
Demand-led transformation of the Livestock	World Bank	2011

Sector in India		
Achieving Double Digit Inclusive Growth – A Rolling Plan 2015-16	Government of AP	2015
Socio Economic Survey 2013-2014	Government of AP	2013
Socio Economic Outlook 2015	Government of Telangana	2014
Economic Survey 2013	Government of Odisha	2013
Outcome budget VII(Agriculture) 2014-2015	Department of Horticulture, AP	2014
Human Development in India: Challenges for a Society in Transition	Sonalde B. Desai et.al	2010
A Study on exports channels of mango products: The role of agri export zone (AEZ) in Chittoor district	Tripuraneni Jaggaiah et at. International Journal of Sales and Marketing	2014
JAPANESE		
激動のインド第4巻:農業と農村	柳澤悠・水島司編	2014
グローバル・フードバリューチェーン戦略～産学官によるMade with Japanの推進～	グローバル・フードバリューチェーン戦略検討会	2014
グローバル・バリュー・チェーン分析に関する調査研究	三菱総合研究所	2012
インドの全国的生鮮野菜流通体系と地方の野菜生産農家	荒木一視、アジア経済研究所	2009
インド・カルナータカ州における農産物卸売市場-規模、立地及び月別入荷同行の分析	荒木一視、地誌研年報	2004
インドの園芸農産物輸入-2000年代以降の生鮮品輸出の拡大-	荒木一視 山口大学	
インドにおける青果物流通：デリー・アーザードプル市場データの解題	黒崎卓・荒木一視	2001
インドにおける加工食品流通構造調査	JETRO	2012
主要国・地域におけるコールドチェーン調査（インド）	JETRO	2014
インドの食品加工業界および食品加工機械業界の市場評価	JETRO	2011
世界・地域分析レポート（モディ首相誕生に沸くインド）	三井物産戦略研究所	2014
貧困プロファイル インド	JICA	2012
インド国民間セクター開発（プロジェクト研究）ファイナルレポート	JICA	2006
インド市場に挑む日系企業	みずほ総合研究所	2007
インドと組む～日印企業によるパートナーリングの実態～報告書	JETRO	2013
BOPビジネス潜在ニーズ調査-インド農業資機材	JETRO	2010
インド投資ガイド	JETRO	2010
インド・ASEAN流通ネットワーク調査	JETRO	2011
農林水産物貿易円滑化推進事業海外貿易制度等調査報告書（インド編）	農林水産省	2008
インドの酪農・乳業事情	畜産産業振興機構	2012

## **ANNEX 5: TOR for the detailed value chain survey**

The Second Party shall implement the following works:

### **1. Title of the Activity**

Detailed value chain study and support for JICA project ‘Information collection and confirmation study of agricultural products value chain in India’

### **2. Period**

December 10, 2014 ~ April 30, 2015

### **3. Place**

AP, Telangana and Odisha

### **4. Activities**

The Activity consists of the following three tasks:

#### Task 1: Selection of crops

Undertake detailed value chain analysis of fruit and vegetable crops considering competitiveness of the state/ region (crops with high potential of export and processing,): Example - Tomato, Mango, Coconut and Nuts etc., - both fresh fruits and vegetables and processed products including non-food such as soaps. This includes six day visits to the selected three states to discuss government officials for the selection of crops.

#### Task 2: Value chain study on the selected crops

##### 1) Study on value chain of fresh crops

- a. Study availability and requirement of post-harvest handling infrastructure from production stage until it reaches the consumers ( across the chain), major stakeholders/ players with such facilities
- b. Study the current post-harvest losses across the chain
- c. Study the prices for each step of value chains from farm gate to consumers for the selected crops for unorganized, and organized retailers and for export. Then, based on the collected price information, analyze the realization of value-added and profit margins for each stakeholders. The analysis include the identification of major activities that each stakeholder conducts such as delivery, grading, and packing.
- d. Study existing marketing systems including innovative marketing concepts both at the rural level as well as urban centers. (Rural level using concepts of SHGs/ Women Groups/ FPOs/cluster) and possibilities of tie-up with retail chains/ institutions/ processing industries directly.

##### 2) Study on the potential value addition/ processing:

- a. Study value addition possibilities of the selected crops at small scale levels (at rural levels by SHGs, women's groups, cluster etc.,) as well as medium and large scale plants. - Example dehydration/ solar drying under hygienic conditions at the rural level; osmotic dehydration of fruits at rural level in small scale to provide innovative products as well as nutrition.
- b. Existing value addition plants (medium and large scale), processing capacities and utilization. Study adequacy of processing capacities as well as technology and status of the existing plants.
- c. Study existing marketing channels supplying fruits and vegetables to processing industries and develop mechanism / models for direct supply to industries by farmers/ farmer groups/ clusters etc.,
- d. Study on technology providers both for small scale and medium and large scale processing operations
- e. Mega Food Park: Study Existing support to Food Park and other enterprises in the food park and support measures required to make the food park successful. (study possibility of funding/ VC assistance to enterprises who buy produce directly from the farmers/ farmer groups)

3) Study on the infrastructure and supporting system

- a. Study on Cold Chain and logistics existing and gaps in the existing infrastructure
- b. Study on credit and capital available for post-harvest handling operations including processing units and identify gaps and problems in the existing system
- c. Capacity building and training of stake holders in the value chain : Study existing systems and gaps (post-harvest handling, value addition, food safety, traceability, marketing, value addition etc., )

Task 3: Support for Japanese mission in March

Support for Japanese consultant team consists of 5 Japanese consultants during its visit to India in March 2015. Provide necessary supports as listed below for the team.

- a. To set up appointments with organizations and visiting support based on the consultation with the Japanese consultant team
- b. To provide support and advice for meetings with related organizations
- c. To provide necessary logistics supports such as reservation of airplane tickets in India, hotels, rental cars etc. if required
- d. Follow up of the second India visit of Japanese consultant team such as additional information collection.

## **ANNEX 6: Outcome of stakeholder workshop**

### **A. Workshop on Chili in Guntur**

#### **1. Outlines of workshop**

**Date:** June 18, 2015

**Time:** 10:30am - 13:30pm

**Venue:** Hotel Grand Nagarujuna in Chittoor

**Participants:** Total 31 excluding 5 members of study team

- Government: 11 ( Horticulture department 4, HRS 2, Spice Board 2, ICAR 1, FSSAI 2, )
- Farmers: 6
- Exporter, Processor: 14

#### **Program:**

- Greeting by Horticulture Department (5min)
- Brief introduction of study and purpose of the workshop by study team (10 min)
- Ice breaking (10 min)
- Presentation on the outcomes of study on Chili by study team (20 min)
- Group discussion (50 min)
- Sharing the outcome of group discussion followed by free discussion (60 min)
- Concluding remarks by Horticulture Department (5 min)

### **2. Outcome of Discussion:**

#### **<Farmer Group 1>**

##### **1. Weakness**

- Land and water in not available.
- Post-harvest mechanism is not reaching to village level.
- Testing aflatoxin and pesticide residue labs are not available at grower level.
- Market facilities which are international standards are not available.
- No access to weather monitoring system
- Producers are not having separate marketing and linkage for IPM/ICM chili
- Other countries are not encouraging to buy Indian commodity. Frequent rejection of export.

##### **2. Strategy**

###### **(1) Production**

- Increasing the local/hybrid seed variety in AP
- Provide soil testing kits to farmers at village level
- Insurance facilities to all farmers of dry land/wet land growers irrespective of small, marginal and big

farmers.

- Harvesting technique- wide range propaganda
- Provide finance to chili growers at 150,000Rs irrespective of small, marginal and big farmers.
- Recommending the variety depending on worldwide demand by the government agencies
- To develop cooperative marketing system
- Strengthen linkage between farmers, exporters and processors
- Availability of testing lab to check pesticide residues, aflatoxin and quality

(2) Post-harvest and marketing

- Assisting the farmer's post-harvest technologies with Govt agencies or by adopting foreign technology
- More support price for good variety

(3) Information

- Establish agro-information desks with electronic display of weather, price and pesticide monitoring to provide timely information to growers.
- Availability of market information to chili producer such as annual production, annual domestic consumption and annual export volume

**<Farmer Group 2>**

1. Measures to be taken

(1) Production

- Farmers awareness about buyer's requirement
- Support mechanization

(2) Long-term linkage with buyers

- Setup an apex body consisting of producer, trader, consumers, processors, exporters, horticulture department, State agricultural university, and ICAR to promote Indian chili

(3) Support IPM in a large way

- Provide IPM input such as bio fertilizer, bio fertilizer
- Training for farmers in post-harvest techniques and sample test
- Punishing people who produces adulterated food products from chili

**<Government Group>**

1. Selected priority strategy

- Strengthening linkage between producers and processors to ensure agrochemical and aflatoxin free

chili

- Promoting safe chili which are free from agrochemical and aflatoxin by promoting IPM/ICM and proper drying methods
- Supporting farmers to produce safe chili by improving drying and IPM
- Increasing production and sales of chili (whole/powder) targeting domestic and international market under brand of “Guntur chili” or “AP chili”

## 2. Measures to be taken

### (1) Quality standard

- Provide training and awareness program to the farmers and traders
- Provide information about required quality standard to farmers
- Verification of seed quality by reliable authority before supplying to farmers
- Training for use of organic fertilizers in cultivation
- Provide information about chemical residues and toxins to farmers
- Provide training of drying method

### (2) Confidence building

- Provide a healthy competitive incentives and awareness through a linking agency (e.g. Cooperative society) between both.
- Arrange regular meetings with farmers and processors

### (3) Cooperative society

- Build cooperative society and APEX body (chili board) to link stakeholders (producers, processors and exporter)

(Spice board responded that the ‘Spice development agency’ is under process to be established.)

### (4) Price fixation

- Set MSP like cotton
- Procurement 15-20% of produce at MSP by government agency

### (5) Provision of necessity

- Total mechanization of crop cultivation to be done
- Provide assistance for the dryers and poly sheet

**<Processor/Exporter Group>**

Prioritized strategies	Achievement	Recommendation
<p><i>Strategy: Supporting farmers to produce safe chili by improving drying and IPM</i></p> <p>-Providing appropriate technologies to farmers such as a) soil preparation, b) nutrition management, c) IPM, d) post-harvest management</p> <p>-Subsidy for inputs to farmers</p>	<p>-Processor to adapt set of chili growers</p> <p>-Educate the farmers for GAP with the support of crop experts</p> <p>-Assisting farmers to draw soil samples and get tested</p> <p>-To adapt good nutrition management, IPM and post-harvest procedures</p> <p>-To arrange subsidy from government agencies</p>	<p>-To form FPO in cluster</p> <p>-Providing training program to farmers</p>
<p><i>Strategy 7: Strengthening linkage between producers and processors to ensure agrochemical and aflatoxin free chili</i></p> <p>-To develop a system of first decision to announce the produce of farmer is fit for export or not (or safe food)</p>	<p>-To adapt adequate facilities to test the chili</p>	<p>-To establish in-house quality lab at exporter /processor level</p> <p>-Government support may be provided for establishment</p>
<p><i>Strategy 4: Increasing export of safety chili by supporting linkage between farmers and processors</i></p> <p>-Announcing MSP, Minimum Support Price, to farmers</p>	<p>-Taking the assurance from 1) overseas buyers, 2) government support for MSP, 3) Premium price to the farmers for approval quality</p>	<p>-Government should declare MSP for chili</p> <p>-More importance to chili or separate chili board should be established</p>

**<Common issues raised>**

- Information and technology for quality control, testing aflatoxin and pesticide residue is required for farmers.
- Linkage between farmers and processor/exporter should be strengthen.
- Capacity of IPM should be developed.
- APEX body consisted of related stakeholders of chili should be developed.
- MSP for chili is expected to be established.

# మిరప, మామిడి ఎగుమతులను పెంచాలి

## • జపాన్ అంతర్జాతీయ సహకార సంస్థ

గుంటూరు, జూన్ 18 (ఆంధ్రజ్యోతి): రాష్ట్రం నుంచి మిరప, మామిడి, టమోటా ఎగుమతులను పెంచడానికి కృషి చేస్తామని జపాన్ అంతర్జాతీయ సహకార సంస్థ (జేఐసీఎఫ్) కన్సల్టెంట్ యోషికో కాండా తెలిపారు. గుంటూరులో గురువారం ఉద్యానవన శాఖ, సైసెస్ బోర్డు, కోల్డ్ స్టోరేజ్ యజమానులు, మిర్చి ఎగుమతిదారులు, జాతీయ ఉత్తమ రైతు ఆవార్డు గ్రహీతలతో జరిగిన సమీక్షలో జపాన్ ప్రభుత్వానికి చెందిన జైకో కన్సల్టెంట్లు ప్రసంగించారు. గుంటూరు జిల్లాలో మిరప, చిత్తూరు జిల్లాలో టమోటా, మామిడి ఉత్పత్తులు, నాణ్యత, మార్కెటింగ్, ఎగుమతులు, అనుబంధ ఉత్పత్తులు తదితర అంశాలపై చర్చించారు. మిరప, కూరగాయలు, పండ్ల ఉత్పత్తుల ఎగుమతుల నాణ్యతను పెంచడంపై భారత్ ధృష్ట పెట్టినట్లు జపాన్ ప్రతినిధులు యోషికో కాండా, సుమికోసిక్ గయా, చియోమామియాలు తెలి




జపాన్ ప్రతినిధులతో అధికారులు, రైతులు

పారు. దేశంలో 2020 నాటికి సుగంధ ద్రవ్యాలు, కూరగాయలు, పండ్ల ఉత్పత్తుల ఎగుమతులు రూ.25 వేల కోట్లకు పెంచాలని లక్ష్యంగా పనిచేస్తున్నట్లు జైకో సంస్థ డైరెక్టర్ ఆర్.ప్రకాష్(బెంగళూరు) తెలిపారు. జపాన్ సంస్థ ఇక్కడ ప్రభుత్వంతో ఎంబోయా కుదుర్చుకోనున్నట్లు వారు చెప్పారు. గుంటూరు జిల్లాలో మిరప, చిత్తూరు జిల్లాలో మామిడి, టమోటా ఉత్పత్తుల్లో నాణ్యత, ఎగుమతులు, మార్కెటింగ్, అనుబంధ ఉత్పత్తులను పెంచడానికి ప్రణాళికలు తయారు చేస్తున్నట్లు చెప్పారు.

There was a stakeholder’s workshop organized at Guntur District on Thursday involving Spices Board, cold storage owners, chili exporters, chili farmers including award winning farmers. The idea was to get inputs / views from the stakeholders and discuss the requirements for improvement. The consultants from JICA Ms. Chiyo Mamiya, Ms. Yoshiko Honda and Ms. Ikegaya were present. They informed that the Government is taking necessary actions for improvement of quality of spices, fruits and vegetables for exports and the exports are also rising. Mr. Prakash, Director CHANGE working with KMC mentioned that the Government has targets to increase exports of spices, fruits and vegetables to about INR25,000 crores by 2020. This study by JICA to look at the present status, gaps and action points for improvement in post-harvest handling of certain fruits and vegetables which will eventually help the farmer in India and also help achieving the targets.

### 3. Presentation of the study team



## Data Collection and Confirmation Study on Agricultural Value Chain in India

Presentation for the workshop on Dry Chilli Guntur, AP on 18 May 2015

Japan International Corporation



## What is JICA (Japan International Cooperation Agency)?

- Japanese development agency
- Assisted India since 1958. JICA is one of the biggest donor to India.
- In the last 50 years, more than INR 1,500 billion ODA loans have been committed for various sectors.
- More than 5,000 Indian personnel have participated in training courses in Japan and more than 800 Japanese experts have come to India to offer their expertise.



## Schedule of Workshop

- Greeting by Horticulture Department (5min)
- Brief introduction of study and purpose of the workshop by study team (10 min)
- Ice breaking (10 min)
- Presentation on the outcomes of study on Chilli by study team (20 min)
- Group discussion (50 min)
- Sharing the outcome of group discussion followed by free discussion (60 min)
- Concluding remarks by Horticulture Department (5 min)

## What do we study?

- ◆ Objectives
  1. To clarify the current situation and bottlenecks of processing, distribution and marketing of farm crops in India
  2. To clarify the roles and activities of both government and the private sector in processing, distribution and sales of farm crops in India
  3. To propose the direction of future assistance by JICA
- ◆ Study Period  
October 2014 – May 2015

## 1. Outlines of the study and Purpose of the workshop

## Outlines of Study

- ◆ Study Team
  - (1) Study Team in Japan
 

Area	Person in charge
Agri-policy & institution1	Chiyo MAMIYA
Agri-policy & institution2	Yoshiko HONDA
Value chain analysis (Horticulture)	Yukio IKEDA
Logistic Infrastructure	Yoshiteru WATANABE
Value chain analysis (Livestock)	Fumiko Ikegaya
  - (2) Partner in India  
Centre for Holistic Agri-food Processing and Green Enterprise (CHANGE)

## Background

- Increasing opportunities for farmers due to structural changes in Agricultural sector
- ✓ Share of horticulture and dairy products in agriculture production values increased from 36% in 1990/91 to 45% in 2009/10
- Difficulties in seizing opportunities due to bottlenecks in value chains
- ✓ Inadequate market infrastructure, fragmented and complicated stakeholders and obscure business practices cause high wastage and low profitability for farmers.
- ✓ Low processing rate and lack of storage facilities.

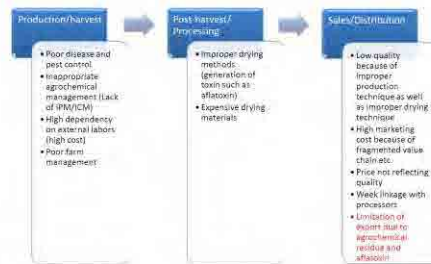
The study aims to identify the area of assistance to remove the bottlenecks in order for farmers and other stakeholders to benefit from the opportunities.

## 2. Outcomes of VC survey on Chilli

## Flow of Study



## Value chain analysis of Chilli

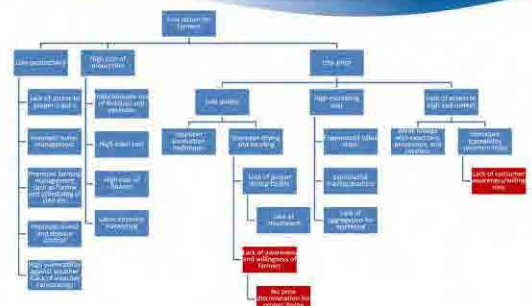


## Purpose of workshop

- Confirm and build a consensus on the current situation and bottlenecks of value chain of Chilli
- Share the needs of assistance for different stakeholders and discuss how the stakeholders can collaborate to solve the bottlenecks
- Discuss and agree on what would be the role of government to improve the value chain

The workshop aims to identify the sustainable way of value chain development.

## Problem analysis of Chilli farmers



## SWOT analysis of Chilli in AP

Opportunity	Threat
<ul style="list-style-type: none"> <li>- Demand of chilli (whole/powder) in both domestic and international market is increasing</li> <li>- Demand of oleoresin, which is extracted from chilli, is increasing in international market</li> <li>- Price of dry chilli is competitive in international market</li> </ul>	<ul style="list-style-type: none"> <li>- Awareness about food safety such as agrochemical residue and aflatoxin is raising specially in international market</li> <li>- Competitions with other countries such as China is high because aflatoxin free chilli is available in China</li> </ul>
Strength	Weakness
<ul style="list-style-type: none"> <li>- Production volume of chilli in AP is the largest in India</li> <li>- There is the Asian largest chilli market in Guntur</li> <li>- The world's largest producer of value added spices has an oleoresin extraction factory in Guntur</li> <li>- Spice Park is planned to be established in Guntur</li> <li>- Guntur chilli has good reputation in India as well as international market</li> <li>- Supporting services and facility by Spice Board are available for chilli in Guntur</li> <li>- Investment climate is conducive in AP</li> <li>- Road connectors to major cities in South India is good</li> <li>- Port facility for export is well established</li> </ul>	<ul style="list-style-type: none"> <li>- Aflatoxin is generated because of inappropriate drying method</li> <li>- Agrochemical is remained because of poor farm management</li> <li>- India chilli has negative reputation as unsafe</li> <li>- Productivity of farmers is low</li> <li>- Production cost is high</li> <li>- Linkage between farmers and processors is limited</li> <li>- Varieties for extracting color are not cultivated</li> </ul>

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## Reference for Discussion

## Strategy for development

	Opportunity	Threat
Strength	<p><i>Strategies to maximize "strength" by using "opportunity"</i></p> <p><b>Strategy 1:</b> Increasing production and sales of chilli (whole/powder) targeting domestic and international market under band of "Guntur chilli" or "AP chilli"</p> <p><b>Strategy 2:</b> Increasing production and sales of oleoresin targeting international market under band of "Guntur chilli" or "AP chilli"</p>	<p><i>Strategies to ensure or overcome "threat" by using "strength"</i></p> <p><b>Strategy 5:</b> Promoting chilli export to countries which food safety regulations are not tight</p>
Weakness	<p><i>Strategies to avoid facing "opportunity" by coping with "weakness"</i></p> <p><b>Strategy 3:</b> Supporting farmers to produce safe chilli by improving drying and IPM</p> <p><b>Strategy 4:</b> Increasing export of safety chilli by supporting linkage between farmers and processors</p>	<p><i>Strategies to avoid the worst scenario by coping with "weakness" and "threat"</i></p> <p><b>Strategy 6:</b> Promoting safe chilli which are free from agrochemical and aflatoxin by promoting IPM/ICM and proper drying methods</p> <p><b>Strategy 7:</b> Strengthening linkage between producers and processors to ensure agrochemical and aflatoxin free chilli</p>

## Successful Indian case

### MAHAGRAPE in Maharashtra

Maharashtra exports 150,000MT (Rs1,400 Crore) of grapes annually. MAHAGRAPES, a marketing partner of cooperatives, contributes to establish the brand and recognition of Maharashtra grape in overseas market.



### <Keys for the success>

- Strong presence of farmers cooperatives and progressive farmers in grape production.
- Strong political and governmental support in its initial stage.
  - Role of Maharashtra State Agriculture Marketing Board (MSAMB)
  - Role of Horticulture Department, APEDA
- Strong linkages and collaborative relationship among stakeholders.
- Successful focused marketing in EU.

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## 3. Discussion on the possible government interventions for Chilli

## Agriculture in India and Japan: Similarity and difference Government structure and its role

India	Japan
<p>Central government:</p> <ul style="list-style-type: none"> <li>- Ministry of Agriculture</li> <li>- Ministry of Food processing</li> </ul>	<p>Central government:</p> <ul style="list-style-type: none"> <li>- Department of food industry in Ministry of Agriculture</li> </ul>
<p>State government (AP):</p> <ul style="list-style-type: none"> <li>- Department of Horticulture</li> <li>- Department of Marketing</li> </ul>	<p>Prefectural government (Chiba):</p> <ul style="list-style-type: none"> <li>- Department of Production promotion</li> <li>- Department of Marketing</li> </ul>
<p>Role of marketing department:</p> <ul style="list-style-type: none"> <li>- Management of APMC markets</li> <li>- Licensing and supervision of contract farming</li> </ul>	<p>Role of marketing department:</p> <ul style="list-style-type: none"> <li>- Management of wholesale markets</li> <li>- Marketing and promotion of agri-produce of Chiba including export</li> <li>- Promoting increasing consumption of horticulture product</li> <li>- Promoting value addition and food processing</li> </ul>

## Agriculture in India and Japan: Similarity and differences Farmers and farmer's organization

India	Japan
<ul style="list-style-type: none"> <li>➤ Dominated by small farmers</li> <li>➤ Low organization rate of cooperatives</li> <li>➤ Self Help Group (SHG), Farmers Producers' Organization (FPO), Producer companies are the alternatives for cooperatives</li> </ul>	<ul style="list-style-type: none"> <li>➤ Dominated by small farmers</li> <li>➤ <u>Extensive network of farmer's cooperatives.</u></li> <li>➤ Around 700 cooperatives with around 10 million members.</li> <li>➤ Cooperatives provide extension services, financial services, collective buying of inputs and collective sales of products</li> <li>➤ Serving as an important channel for coordinating government assistance</li> </ul>

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## Supporting contract farming

1. Background
  - Increasing share of horticulture crops which are not sold through existing wholesale system
  - Difficulties for farmers and processors to find appropriate partners for contract farming
  - Difficulties of farmers to meet the requirement of processors
2. What do they do?
  - Provide matching opportunities for farmers and processors
  - Provide subsidy to cover the cost of procuring materials to meet the requirement of contract at the time of bad harvest
  - Provide subsidy to compensate loss of farmers

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## Increasing market competitiveness of horticulture product : Develop a CNBA Brand

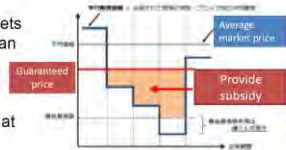
1. Background
  - Increasing competition among domestic producers of horticulture products for more market share.
  - Increasing demand of fresh vegetable from big retailers who want vegetable in bigger volume.
2. What do they do?
  - Establish a mechanism to discuss and coordinate issues among various stakeholders related to selected crops
  - Train core personnel who can initiate, lead and coordinate the issues related to production of selected crops at major production areas.
  - Standardize grading, quality and packaging materials for selected crops and adjust production cycles based on the consolidated marketing strategy.

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## Ensuring stable supply of major crop

1. Background
  - Unstable supply of major vegetable in 1960's and 70's in Japan
  - Unstable price affected heavily to farmers' life.
2. What do they do?
  - Designate major crops, production areas and markets
  - Develop demand/supply plan for designated crops every year.
  - Develop a special fund to provide subsidy to farmers at the time of price drop.



## Increasing linkage between producers and processors

1. Background
  - Declining domestic demand of fresh vegetable in Japan
  - Increasing demand of vegetables as a raw material of processed or cooked food
2. What do they do?
  - Provide subsidy producers **who have supply contract with processors**
  - Applied producers should observe the contract with processors
  - Applied producers should carry out the reform to stabilize the harvest such as pest control, water retention and soil improvement
  - Applied producers should achieve the performance target

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## Assisting farmers to increase value addition at farm level

1. Background
  - Declining demand of agri-produce in Japan
  - Decreasing income earning opportunities in rural areas
2. What do they do?
  - Assist farmers in processing and selling products by themselves
  - Interested farmers should develop a business plan with the assistance from prefecture government
  - Once the plan is approved by Ministry of Agriculture, farmers can avail the following support
    - Financial assistance (loan, subsidy, equity) for product development, facilities and marketing
    - Administrative incentive
    - Technical support and networking



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## Please discuss...

### 1. Which strategy is more important than others and why?

Choose three strategies which the group thinks more important than others. List up reasons.

(10 minutes only for the first round)

### 2. What you can/should do to achieve the strategy?

➤ Think what your group can/should do to achieve the strategy selected.

➤ Please list up what your group can/should do first, then identify the areas required support. (not the other way round!)

(10 minutes for the first round and 15 minutes for the second and the third round)

## The role of café master



- You are the boss of the table!
- Facilitate discussion.
- For the second and the third round, give the members the summary of previous discussion
- Summarize and present the outcome
- Have fun!

## Points of Discussion

### 1. Role of Government

The role of AP government in marketing agri-produce and promoting processing is very limited to date. Is the government willing and capable to take up a new role?

### 2. Collaboration among stakeholders

Assisting value chain will not be possible without collaboration among various stakeholders involving different processes of value chain. The issue is what the effective way of collaboration, especially among government, farmers and private sectors is.

### 3. Aggregation

One of the major bottleneck in AVC in India is a difficulty of aggregation due to lack of farmer's groups. Any assistance will not be effective without scaling up the supply volume. How to overcome this challenge?

## Rules for dialogue

- **Be positive**
- **Focus on what matters**
- **Think something cost free and easy to adopt**
- Contribute your thinking
- Speak your mind and heart
- Listen to understand (Not criticize!)
- **Link and connect ideas**
- Listen together for insights and deeper questions
- **Play, Doodle and Draw** – Writing on the tablecloths is encouraged!
- **Have fun!**

## What is World Cafe



- A methodology which facilitates effective and in-depth dialogue among large number of people.
- Participants can discuss issues in a free and relaxed atmosphere.



## **B. Workshop on Mango and Tomato in Chittoor**

### **1. Outlines of Workshop**

**Date:** June 24, 2015

**Time:** 11:00am - 14:00pm

**Venue:** Horticulture Department Office in Chittoor

**Participants:** Total 29 excluding 6 members of study team

- Government: 4 ( Horticulture department 2, AMC 1, NABARD 1)
- Farmers: 13 (mango 9, tomato 4)
- Processor: 7 (Jain 2, Srini 2 other 3)
- Research :2

### **Program:**

- Greeting by the Horticulture Department (5 min)
- Brief introduction of study and purpose of the workshop (10 min)
- Workshop Session (140 min)
- Presentation on the outcomes of study (40 min)
- Presentation on the examples of government interventions for AVC (20 min)
- Group discussion (50 min)
- Sharing the outcome of group discussion followed by free discussion (30 min)
- Concluding remarks by Horticulture Department (5 min)

### **2. Outcomes of Discussion:**

#### **<Tomato Group A>**

Necessary actions to achieve the target

1) Farmer's view:

- Reasonable price
- Suitable and high yield variety
- Input support (subsidy)
- Market linkage with bulk buyers such as retail chains or processors
- Training on GAP, crop handling

2) Processor's view

- Promote processing variety
- Supply at reasonable price
- Assured supply of ...
- Support for price fluctuation

- Encourage exclusive processing unit for tomato
- GAP certification

### 3) Actions to be taken

- Crop planning: identify zones, variety required for processing
  - Khalif: Focus on fresh market
  - Rabi: Focus on processing
- Cooperative society: formation of FPO, coops for tomato
- Price fixation by government in consultation with farmers and processors
- Processing season: February and March
- Awareness about processing and market requirement

### <Tomato Group B>

#### 1. Selected target market

High end domestic market (tomato)

#### 2. Reasons to select “high end domestic market”

##### 1) Reasons to select “high end domestic market”

- Seed for domestic market is available
- There is better marketing opportunities since good market such as Chennai is nearby
- Two crops in a year can be cultivated due to suitable climate
  - a) Risk can be mitigated in terms of both production and market wise
  - b) Minimum rate is assured (cost of production is returned)

##### 2) Reasons not to select “international market”

- If we target international market, farmers have to formulate group for stable supply in terms of quality and volume. But it formulating a farmers group is difficult.
- No specific department to guide the farmers for international market (Since supporting to export tomato cannot be done only by the Horticulture department, a specific organization consolidated several departments or organizations are needed)

#### 3. Necessary actions to achieve the target

- Government should supply seed timely
- Government should support for inputs such as mulching and drip irrigation
- Market price should be stabilized to assure income of farmers
- If farmers go for organic farming, the production will be decreased. Someone should support at least

for two years

**<Mango Group A>**

1. Selected target market and necessary actions

Targeting market	Necessary actions
International fresh mango market (Primary targeting market)	Promote Benishan for the international markets
Domestic fresh mango market (Secondary targeting market)	Promote Benishan, Malika, Himam Pasana for the markets of major cities
Supply processing firms (Tertiary targeting market)	Government should intervene and set the purchasing price of mango (for processing based on the price of pulp) before harvesting time. Or government should initiate the price stabilization mechanism for processing varieties
Common to all the markets	Mango farmers' cooperatives should be set up at state level for collective procurement of input and collective marketing.

**<Mango Group B>**

1. Selected target market

Export of processed products

2. Reason to select “export of processed products”

- Farmers who provide products to Pepsi, JAIN irrigation etc. can get the better selling price.
- Exporting of table variety is decreasing in volume these days.

3. Necessary actions to achieve the target

1) Formation of farmers group at mandal level.

(There are 48 mandal in Chittoor district and 20 groups comprised of 3000 members, but it is not functioning well.)

- Good coordination with Horticulture officers is necessary to get information of good variety and inputs. It is difficult for farmers to know what kind of variety and inputs are good to use.
- For developing good market infrastructure including collection centers.
- For changing variety which is suitable for processing.
- For getting better marketing channels and getting Minimum Support Price for Mango.

- Elimination of middlemen is required, as many farmers are cheated and sell at unreasonable price. Facility of direct sales to the market for farmers needs to be developed.
- Latest technology is needed (or from Japan).
- Financial support from government for farmers to purchase inputs. 90% of subsidies is given to install drip irrigation, but many small farmers face difficulties to access the finance.

## 2) Establishment of Mango board


(Proposal was already submitted by Chittoor farmers' association)

- For farmers to have bargaining and control power on the price.
- For facilitating marketing.

### <Common issue raised>

- Importance of coordination between different government departments
- Necessity of formation of farmers' cooperative/society
- Necessity of government intervention to price stabilization/minimum price support

### 3. Presentation by the study team



## Data Collection and Confirmation Study on Agricultural Value Chain in India

Presentation for the workshop on MANGO/TOMATO  
24 June 2015 in Chittoor, AP

Japan International Corporation



## What is JICA (Japan International Cooperation Agency)?

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- In the last 50 years, more than INR 1,500 billion ODA loans have been committed for various sectors.
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## Schedule of Workshop

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- Concluding remarks by Horticulture Department (5 min)

## What do we study?

- ◆ Title: Information collection and confirmation study on **Agricultural Value Chain in India**
- ◆ Objectives
  1. To clarify *the current situation and bottlenecks* of processing, distribution and marketing of farm crops in India
  2. To clarify *the roles and activities of both government and the private sector* in processing, distribution and sales of farm crops in India
  3. To propose *the direction of future assistance by JICA*
- ◆ Study Period  
October 2014 – September 2015

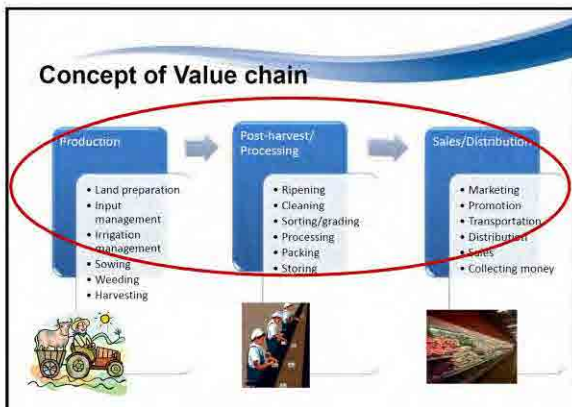
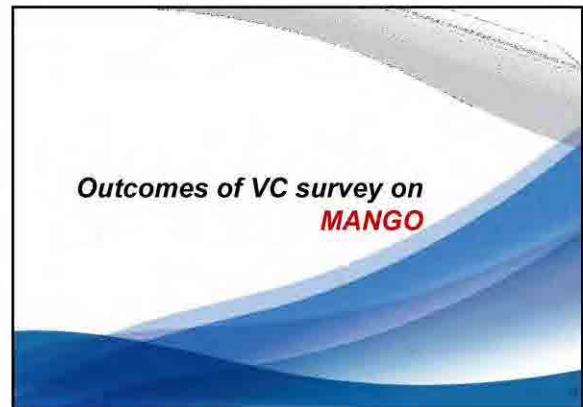
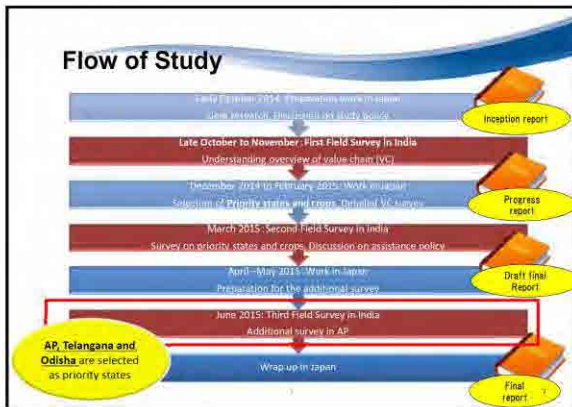
## Introduction of JICA and Study

## Who are we?

- ◆ Study Team
- (1) Study Team in Japan

Area	Person in charge
Agri-policy & Institution1	Chiyo MAMIYA
Agri-policy & Institution2	Yoshiko HONDA
Value chain analysis (Horticulture)	Yukio IKEDA
Logistic infrastructure	Yoshiteru WATANABE
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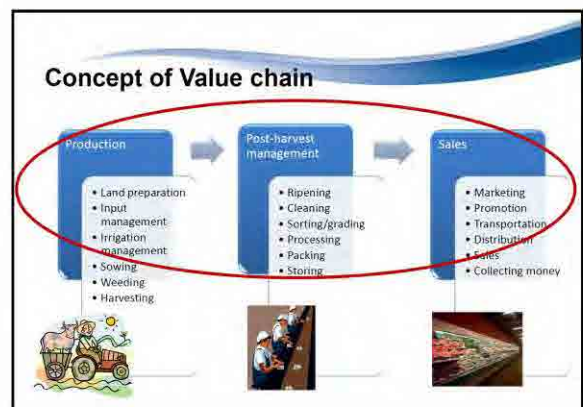
- (2) Partner in India  
Centre for Holistic Agri-food Processing and Green Enterprise (CHANGE)



### SWOT analysis of Mango in AP

Opportunity	Threat
<ul style="list-style-type: none"> <li>Demands for processed mango products are increasing in both domestic and international markets.</li> <li>Demand for high value fresh mango in domestic market is increasing although it is small.</li> <li>Some foreign investors in food processing industries are interested to do business in AP.</li> </ul>	<ul style="list-style-type: none"> <li>Increasing competitions with other countries such as Kenya, Thailand, Philippines.</li> <li>Competition with other states in India.</li> <li>Increasing awareness for food safety such as chemical residue and insects in the international markets.</li> <li>Increasing labor costs.</li> </ul>
Strength	Weakness
<ul style="list-style-type: none"> <li>Large production volume.</li> <li>Agglomeration of large scale processors which are competitive in global market.</li> <li>Availability of supporting services and facility such as opening chambers and VHT.</li> <li>Existence of fresh mango exporters.</li> <li>Conducive investment climate.</li> <li>Good road connections to major cities.</li> <li>Availability of airport for export.</li> </ul>	<ul style="list-style-type: none"> <li>Water shortage, pest and disease.</li> <li>Improper harvest and post-harvest handling.</li> <li>Weak incentive to improve quality.</li> <li>Weak linkage between farmers and processors.</li> <li>Weak linkage between farmers and high value market.</li> <li>Low brand image of Indian mango in the international market.</li> </ul>

- ### Purpose of workshop
- Confirm and build a consensus on the current situation and bottlenecks of value chain of Mango and Tomato
  - Share the needs of assistance for different stakeholders and discuss how the stakeholders can collaborate to solve the bottlenecks
  - Discuss and agree on what would be the role of government to improve the value chain
- The workshop aims to identify the sustainable way of value chain development



## Market options

1. APMC market
2. High value domestic market
3. High value export market
4. Domestic processing market
5. Export processing market

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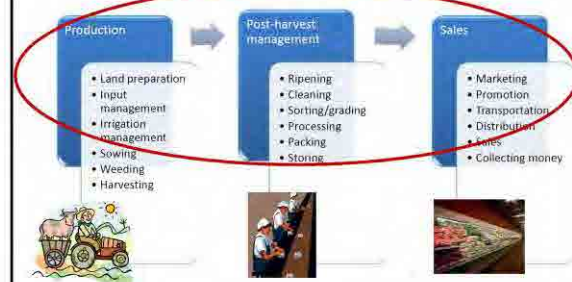
## SWOT analysis of Tomato in AP

Opportunity	Threat
<ul style="list-style-type: none"> <li>• High demand of tomato in India</li> <li>• Increasing demand of processed tomato in both domestic market</li> <li>• High interest of foreign investors in food processing industries in AP</li> <li>• Increasing price of processed tomato from China</li> </ul>	<ul style="list-style-type: none"> <li>• Large price fluctuation of tomato</li> <li>• Stable supply of processed tomato from China and other countries</li> </ul>
Strength	Weakness
<ul style="list-style-type: none"> <li>• Large tomato production volume in AP</li> <li>• Availability of high yield variety</li> <li>• Large subsidies and supports provided by government</li> <li>• Conducive investment climate</li> <li>• Good road connections to major cities in South India</li> <li>• Suitable climate for tomato cultivation</li> <li>• Experienced farmers of tomato cultivation</li> </ul>	<ul style="list-style-type: none"> <li>• Poor farm management</li> <li>• Water shortage</li> <li>• Weak linkage between farmers and processors</li> <li>• Less cultivation of processing variety</li> </ul>

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Market	Production	Post-Harvest	Distribution/sales
<b>Common problems to all types of markets</b>	<ul style="list-style-type: none"> <li>• Water shortage</li> <li>• Pest and disease</li> <li>• Size of trees prevent proper harvest</li> <li>• Many farmers are small scale</li> <li>• Difficult to form group</li> <li>• Increasing labor costs</li> <li>• Lack of knowledge and training</li> </ul>	<ul style="list-style-type: none"> <li>• Improper handling causes damage</li> <li>• Many farmers do not use crates</li> </ul>	<ul style="list-style-type: none"> <li>• Many farmers depend on traders for advanced payment and difficult to seek alternative channels</li> <li>• Many farmers will go to pre-harvesting contractors, which makes difficult to improve quality</li> </ul>
<b>APMC &amp; other domestic Market</b>		<ul style="list-style-type: none"> <li>• Improper handling in loading and unloading in the markets</li> </ul>	<ul style="list-style-type: none"> <li>• Unclear trading practice in APMC market (on commission rates)</li> </ul>
<b>High end domestic market-tahle variety</b>	<ul style="list-style-type: none"> <li>• Fluctuation of yield</li> <li>• Lack of skills to grow high quality mango</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of skills on handling and grading</li> <li>• Lack of treatment and packing facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Low public awareness on the danger of calcium carbide</li> <li>• Weak linkages between farmers and high-end markets</li> </ul>
<b>International Market- Fresh Mango</b>	<ul style="list-style-type: none"> <li>• Fluctuation of yield</li> <li>• Lack of skills to grow high quality mango</li> </ul>	<ul style="list-style-type: none"> <li>• Know-how on proper treatment and packing have not been accumulated</li> </ul>	<ul style="list-style-type: none"> <li>• Export volume of fresh mango from the local exporters is small</li> <li>• Low brand image on Indian mango</li> </ul>
<b>Domestic &amp; international- Processed mango</b>		<ul style="list-style-type: none"> <li>• Lack of village level processing facilities and pack house</li> </ul>	<ul style="list-style-type: none"> <li>• Weak and unorganized linkages between farmers and large scale processors</li> </ul>

## Concept of Value chain



## Outcomes of VC survey on TOMATO

## Market options

1. APMC market
2. Domestic high value market
3. Domestic processing market
4. Export high values market
5. Export processing market

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Market	Production	Post harvest	marketing
Common problem to all markets	<ul style="list-style-type: none"> <li>Water shortage</li> <li>Poor farm management</li> </ul>	<ul style="list-style-type: none"> <li>High post harvest loss because of improper handling</li> </ul>	
APMC market			<ul style="list-style-type: none"> <li>Large price fluctuation</li> </ul>
High end domestic market	<ul style="list-style-type: none"> <li>Less awareness of farmers on high value added market</li> <li>No availability to produce high value tomato.</li> </ul>	<ul style="list-style-type: none"> <li>Lack of knowledge on proper post harvest management for high end market</li> </ul>	<ul style="list-style-type: none"> <li>Less market linkage between farmers and retailers/consumers</li> <li>Small high end market in domestic market</li> </ul>
High end international market			<ul style="list-style-type: none"> <li>Less market linkage between farmers and exporters</li> <li>Lack of exporters</li> </ul>
Processed tomato in domestic market	<ul style="list-style-type: none"> <li>No scientific study on better farm management for cultivation of processing variety</li> <li>No proper processing variety cultivated</li> </ul>		<ul style="list-style-type: none"> <li>Unstable procurement of tomato with certain price</li> <li>Less linkage and trust between farmers and processors</li> <li>Contract farming is not applied</li> <li>Unstable production of processed tomato</li> </ul>
Processed tomato in international market		<ul style="list-style-type: none"> <li>No traceability</li> </ul>	<ul style="list-style-type: none"> <li>Unstable procurement of tomato with certain price</li> <li>Less linkage and trust between farmers and processors</li> <li>Contract farming is not applied</li> <li>no sufficient production of processed tomato</li> <li>Lack of exporters</li> </ul>

### Agriculture in India and Japan: Similarity and Difference Government structure and its role

India	Japan
<p>Central government</p> <ul style="list-style-type: none"> <li>Ministry of Agriculture</li> <li>Ministry of Food processing</li> </ul> <p>State government (AP)</p> <ul style="list-style-type: none"> <li>Department of Horticulture</li> <li>Department of Marketing</li> </ul> <p>Role of marketing department</p> <ul style="list-style-type: none"> <li>Management of APMC markets</li> <li>Licensing and supervision of contract farming</li> </ul>	<p>Central government</p> <ul style="list-style-type: none"> <li>Department of food industry in Ministry of Agriculture</li> </ul> <p>Prefectural government (Chiba)</p> <ul style="list-style-type: none"> <li>Department of Production promotion</li> <li>Department of Marketing</li> </ul> <p>Role of marketing department</p> <ul style="list-style-type: none"> <li>Management of wholesale markets</li> <li>Marketing and promotion of agri-produce of Chiba including export</li> <li>Promoting increasing consumption of horticulture product</li> <li>Promoting value addition and food processing</li> </ul>



### Agriculture in India and Japan: Similarity and differences Farmers and farmer's organization

India	Japan
<ul style="list-style-type: none"> <li>Dominated by small farmers</li> <li>Low organization rate of cooperatives</li> <li>Self Help Group (SHG), Farmers Producers' Organization (FPO), Producer companies are the alternatives for cooperatives</li> </ul>	<ul style="list-style-type: none"> <li>Dominated by small farmers.</li> <li>Extensive network of farmer's cooperatives.</li> <li>Around 700 cooperatives with around 10 million members.</li> <li>Cooperatives provide extension services, financial services, collective buying of inputs and collective sales of products</li> <li>Serving as an important channel for coordinating government assistance</li> </ul>

### Successful Indian case

#### MAHAGRAPE in Maharashtra

Maharashtra exports 150,000MT (Rs1,400 Crore) of grapes annually. MAHAGRAPES, a marketing partner of cooperatives, contributes to establish the brand and recognition of Maharashtra grape in overseas market.



#### <Keys for the success>

- Strong presence of farmers cooperatives and progressive farmers in grape production.
- Strong political and governmental support in its initial stage.
  - Role of Maharashtra State Agriculture Marketing Board (MSAMB)
  - Role of Horticulture Department, APEDA
- Strong linkages and collaborative relationship among stakeholders.
- Successful focused marketing in EU.



### Increasing market competitiveness of horticulture product : **Develop a CHIBA Brand**

- Background
  - Increasing competition among domestic producers of horticulture products for more market share.
  - Increasing demand of fresh vegetable from big buyers who want vegetable in bigger volume.
- What do they do?
  - Establish a mechanism to discuss and coordinate issues among various stakeholders related to selected crops
  - Train core personnel who can initiate, lead and coordinate the issues related to production of selected crops at major production areas.
  - Branding including standardized grading and packaging materials
  - Develop an integrated marketing strategy for Chiba crops including adjusting production and sales timing

## Increasing linkage between producers and processors

1. Background
  - Declining domestic demand of fresh vegetable in Japan
  - Increasing demand of vegetables as a raw material of processed or cooked food
2. What do they do?
  - Provide subsidy against the improvement plan of producer's organizations who have supply contracts with processors
  - Applicants are obliged to carry out at least three reforms in soil improvement, pest management, water retention and drainage.
  - Applicants should produce and supply raw materials which fulfill the needs of processors
  - Horticulture department of the prefecture should be involved in the application process.

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## Assisting farmers to increase value addition at farm level



1. Background
  - Declining demand of agri-produce in Japan
  - Decreasing income earning opportunities in rural areas
2. What do they do?
  - Assist farmers in processing and selling products by themselves
  - Interested farmers should develop a business plan with the assistance from prefecture government
  - Once the plan is approved by Ministry of Agriculture, farmers can avail the following support
    - ✓ Financial assistance (loan, subsidy, equity) for product development, facilities and marketing
    - ✓ Administrative incentive
    - ✓ Technical support and networking

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## Supporting contract farming

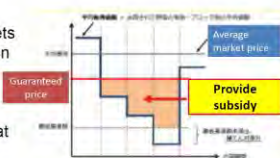
1. Background
  - Increasing share of horticulture crops which are not sold through existing wholesale system
  - Difficulties for farmers and processors to find appropriate partners for contract farming
  - Difficulties of farmers to meet the requirement of processors
2. What do they do?
  - Provide matching opportunities for farmers and processors
  - Provide subsidy to cover the cost of procuring materials to meet the requirement of contract at the time of bad harvest
  - Provide subsidy to compensate loss of farmers at the time the market price is higher than the contract price

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## Group Discussion

## Ensuring stable supply of major crop

1. Background
  - Unstable supply of major vegetable in 1960's and 70's in Japan
  - Unstable price affected heavily to farmers' life.
2. What do they do?
  - Designate major crops, production areas and markets
  - Develop demand/supply plan for designated crops every year.
  - Develop a special fund to provide subsidy to farmers at the time of price drop.



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## Please discuss...

1. **Which market is more important than others and why?**  
Choose one market each for the crop which the group thinks more important than others. List up reasons.  
(10 minutes only for the first round)
2. **What you can/should do to explore the target market?**  
➢ Think what your group can/should do to achieve the strategy selected.  
➢ Please list up what your group can/should do first, then identify the areas required support. (not the other way round!)  
(15 minutes for the first round and 20 minutes for the second round)

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## Points of Discussion

### 1. Role of Government

The role of AP government in marketing agri-produce and promoting processing is limited to date. Is the government willing and capable to take up a new role?

### 2. Collaboration among stakeholders

Assisting value chain will not be possible without collaboration among various stakeholders such as government, farmers and private sectors. The issue is what the effective way of collaboration is.

### 3. Aggregation

One of the major bottleneck in AVC in India is a lack of aggregation due to difficulties of organizing farmer's groups. Any assistance will not be effective without scaling up the supply volume. How to overcome this challenge?

### 4. Price

Supplying processors may not promise high price but it can be stable income. It is also profitable if the productivity increases and the cost is lower. On what conditions are the farmers willing to choose that option?

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## Rules for dialogue

- **Be positive**
- **Focus on what matters**
  - *Think something cost free and easy to adopt*
- Contribute your thinking
- Speak your mind and heart
- Listen to understand (Not criticize!)
- **Link and connect ideas**
- Listen together for insights and deeper questions
- **Play, Doodle and Draw** – Writing on the tablecloths is encouraged!
- **Have fun!**

## What is World Cafe



- A methodology which facilitates effective and in-depth dialogue among large number of people.
- Participants can discuss issues in a free and relaxed atmosphere.



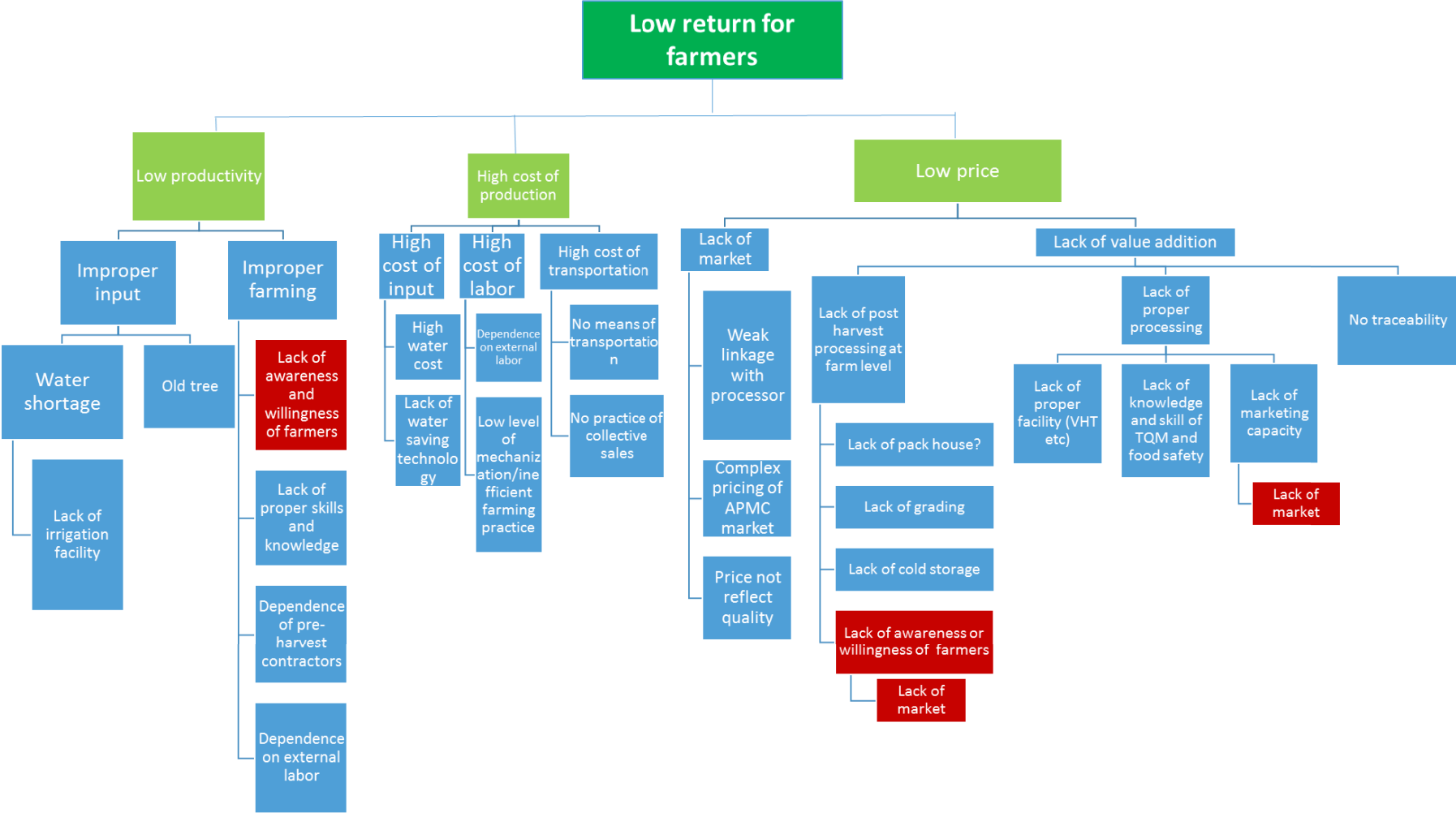
## The role of café master



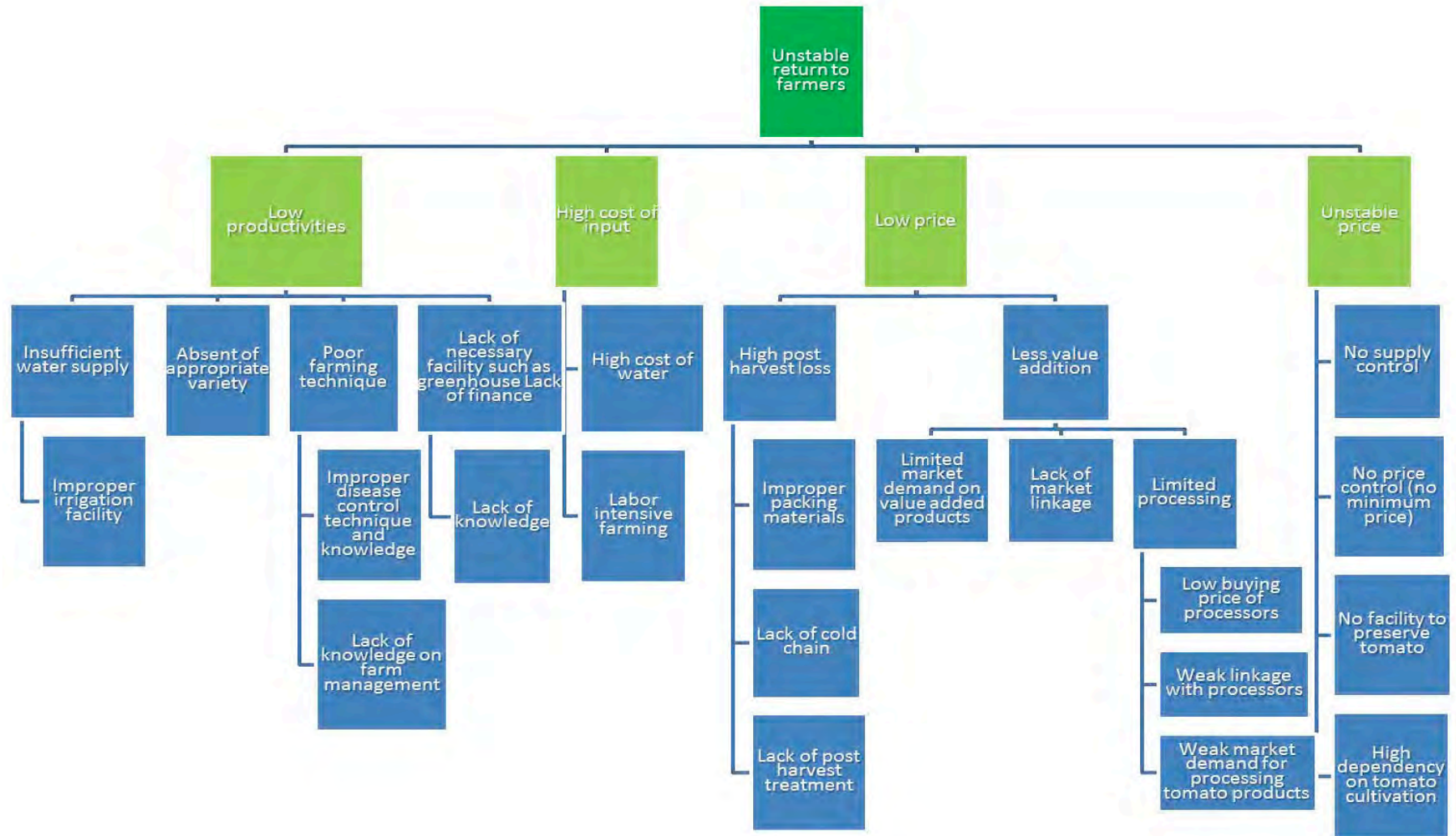
- You are the boss of the table!
- Facilitate discussion.
- For the second and the third round, give the members the summary of previous discussion
- Summarize and present the outcome
- Have fun!

**ANNEX 7: Problem analysis of priority crops in AP**

**(1) Mango**



(2) Tomato



(3) Chili

