www.pwc.in

Study on identification of export oriented integrated infrastructure for agri products from Punjab, Haryana & Himachal Pradesh

Agricultural and Processed Food Products Export Development Authority (APEDA)

Strictly Private and Confidential

June 2015

pwc

Table of contents

List of Figures & Tables:

1. Introduction

1.1. Background

Agriculture is the backbone of Indian economy and provides employment to a large majority of Indian work force. The nation has a vast potential in contributing to international food trade on the account of its cultural dependence on agriculture and the agro climatic variety that gives rise to a large food basket suitable for international trade and earning foreign exchange for Indian economy. India has an edge in production of a number of food commodities such as cereals, milk, buffalo meat, fruits such as mango, banana, guava and papaya, vegetables and fish. Despite large production volumes and huge potential in strategic development role in Indian economy through processing, majority of the production is consumed in the domestic market with low levels of processing and export. Food processing links the largely unorganized Indian agriculture sector and industry. In India, the sector is in nascent stage and contributes only 1.49% to national GDP.[1] Optimizing the production, processing and enabling them to work in tandem, is bound to boost Indian economy and the farming community alike. To accelerate the both aspects of the supply chain synergistically, strategic investment is required in the infrastructure pertaining to transportation, storage, processing and export. In the current scenario, upgradation of availability and quality of food processing and export infrastructure complimenting the endeavors in market development for food export demands the most attention.

Agricultural and processed Food Products Export (APEDA) is the leading government body to augment the agri production and its suitability to meet food processing and export requirements by providing technical and financial assistance to the stakeholders in agri value chain from production to export. The current study fits in the scope of APEDA to outline the production potential and catchment areas of suitable agricultural produce, and to identify the gaps in export oriented infrastructure of food and the potential role of various stakeholders in the value chain for upgrading the infrastructure, process and creating a momentum in the nation's food export. The following table gives a snapshot of the status of various food processing industry segments in India and the underlying opportunities:

Table 1: Market overview and opportunities[1]

Segment	Market Overview	Opportunities
Meat & Poultry	The segment is dominated by unorganized	• Only 1-2% of the raw meat undergoes value addition • Most of the raw meat meets domestic consumption in raw form • Eggs and broilers show a growth rate of 16% and 20% respectively
Fruits and Vegetables	• Equally divided between organized and unorganized sector • Organized sector dominates juices and pulp products while unorganized sector deals in pickles and sauces	• World's 2nd largest production • Current processing level of around 10% • High suitability for export

[1] [1] Food Processing Industry in India: Adding value by creating synergy between agriculture and industry, ONICRA, available online http://www.onicra.com/images/pdf/publications/foodprocessingindustry31may.pdf

Segment	Market Overview	Opportunities
Dairy	• Segment dominated by unorganized sector • Cooperatives are the major players • A few FMCG brands have focus in the segment	• India is the leading producer in the world • Large production base
Fish	• Small scale unorganized sector is dominant	• Third largest producer globally • Second largest inland fish production globally • Very high export potential
Cereals/ grains	• market controlled by the unorganized sector	• High scope of technological upgradation • Self-sufficiency in production

1.2. Need of Study

Despite a strong position in production of agri commodities, Indian contribution in the global food trade is limited to 1.5%[2] which is drastically low as compared to its respective share in the production. Despite government's sustained efforts to enhance production through a spectrum of assistance schemes and programmes, implementation of these schemes has to be orchestrated with a strong focus on channelizing the production through creation of supporting infrastructure and optimizing the value chain that terminates in the domestic and overseas markets for processed food. There are a number of limiting factors that afflict Indian food export scenario such as:

- Lack of market oriented production
- Inadequate backward linkages
- Lack of implementation of global food quality and safety management systems
- Predominance of unorganized sector in the sector
- Capital intensive nature of the sector
- Inadequate post-harvest handling and processing infrastructure and low economies of scale
- High cost of transportation and low quality resulting in the loss of volume and quality of perishables
- Instability in the commodity prices and unpredictable market forces

To address the above challenges and optimizing the utilization of production surplus for foreign exchange, following thematic areas need to have a critical focus:

- Promoting Public-Private Partnerships for infrastructure creation, introducing suitable processing and logistical technology and upgrading the current supporting infrastructure.

[2] India food industry – high growth, high – profit sector, FnB News, Retreived online http://www.fnbnews.com/Top-News/highgrowth-highprofit-sector-38270

- Developing a dynamic cold chain and transportation system with focus on air-conditioned cargo, and refrigerators/ insulated containers for perishables, processed products to minimize post-harvest losses at transportation stage and at retail level.
- Providing financial incentives for creation of facilities for procurement of commodities, sorting, grading and transportation of agri produce to markets and processing facilities.

To take impactful initiatives, the existing infrastructure and process flow in the agri supply chain has to be evaluated. This would help in identifying the enablers and inhibitors of agri exports from India. In addition to these factors, importance of the current study is also heightened by growing competition from other countries in the global food trade.

1.3. Objectives

The current study was carried out keeping in view the following objectives as per the terms of reference of the assignment:

- Study of the currently available infrastructure in the states of Punjab, Haryana & Himachal Pradesh and identifying the underlying gaps in the above mentioned infrastructure facilities for enabling higher exports
- State-wise assessment of the availability, performance and utilization of existing infrastructure associated with agricultural export
- Assessment of the key commodities suitable for export and their availability
- Identifying the possible areas for PPP approach for infrastructure and technology upgradation
- Formulating recommendations based on the study

1.4. Scope of the assignment

For meeting the objectives stated as per the terms of reference under the assignment, an in- depth study was conducted assimilating the data from secondary sources in the public domain and our interactions with the stakeholders in the agri export value chain such as exporters, State government officials of Punjab, Haryana & Himachal Pradesh, Officials of exporter associations and local officials of APEDA. Following areas of study have been scoped out under the assignment:

- Pre and post-harvest handling facilities, cold chain systems, storage and processing facilities and the infrastructure facilitating value addition of the agricultural commodities in the Focus States of Punjab, Haryana & Himachal Pradesh
- Identification of relevant sea ports, ICD's, warehouses, distribution centers, quality testing infrastructure and CPC's at airport etc.
- Study of commodities suitable for export from the Focus States (raw, semi processed & processed), their availability and surplus volumes available for processing, value addition and exports
- Assessment of infrastructure requirements specific to each of the Focus States based on the production profile and the suitability of the currently available infrastructure thereof for implementing PPP model
- State wise gap analysis of the available infrastructure to enhance export potential pertaining to the production clusters in the respective states out of the 17 clusters identified by APEDA

- Analysis of the available procurement infrastructure for cluster specific commodities and the gaps to be bridged in this regard
- Commodity wise analysis of the required infrastructure for boosting the export of products with production concentrated in Punjab, Haryana & Himachal Pradesh such as Kinnow in Punjab, Apples from Himachal Pradesh with potential for export
- Identification of the existing infrastructure in the export value chain of these region specific commodities suitable for implementation in PPP mode for export promotion
- Recommendations on operations and management of existing export oriented infrastructure based on gap analysis and specific agricultural commodities suitable for export produced therein

2. Current Scenario of Agricultural Export from India

2.1. Demand for agricultural products at international level

For centuries countries have relied on trade in agricultural and food commodities to supplement and complement their domestic production. The uneven distribution of land resources and the influence of climatic zones on the ability to raise plants and animals have led to trade between and within continents. Historical patterns of settlement and colonization contributed to the definition of trade patterns and to the emergence of infrastructure to support such trade. Changes in consumer taste have encouraged the emergence of global markets and added to the significance of trade. Few countries could survive the elimination of agricultural trade without a considerable drop in national income, and none could do so without considerable reduction in consumer choice and well-being.

In 2013, the agriculture trade performance was a reflection of the global economic context: many key players in agricultural trade displayed stagnant or lower exports and imports and though the demand in developing economies continued to grow, it was at a slower pace. China is trying to keep up the domestic demand and it has become a major player both as an agricultural importer and exporter.

In 2013, the top 5 agricultural exporting nations were US, Brazil, China, European Union and Canada. The major traded agriculture commodities around the world include fruits and vegetables, cereals and cereals preparation, meat and meat products, fish and marine products, coffee, tea, cocoa, spices and dairy products. The major agricultural products importing nations in the world include US, China, Japan, Russia, European Union and Canada.

Agriculture in India is the mainstay of the rural population of the country. Since independence, India has made a lot of progress in agriculture in terms of growth in output, yields and area under crops. It has gone through a Green Revolution (food grains), a White Revolution (milk), a Yellow Revolution (oilseeds) and a Blue Revolution (aquaculture). Today, India is one of the largest producers of milk, fruits, cashew nuts, coconuts and tea in the world. It is also well known for the production of wheat, vegetables, sugar, fish, tobacco and rice.

Certain types of agriculture such as horticulture, organic farming, floriculture, genetic engineering, packaging and food processing have the potential to see a surge in revenues through exports. Over the past few years, the government has stressed on the development of horticulture and floriculture by creating vital infrastructure for cold storage, refrigerated transportation, packaging, processing and quality control. If India wishes to optimize the production and export potential of these commodities, then it is essential to improve these facilities, marketing and export networks much further.

India is a major exporter of commodities like apples, mangoes, grapes, onions, pomegranates, cut flowers, vegetables, processed fruits and vegetables, fishes, meat and meat products, eggs, tea, tobacco etc. Apart from the export of above commodities India is also an importer of agricultural commodities like apples, edible oils, coconuts, marine products, meat products and dairy products.

2.2. Trend analysis of agricultural export from past data (5 to 10 years)

The exports of agricultural products around the world have increased by almost 6 per cent to US$ 1,745 billion in 2013, as compared to the previous year. The growth rate registered by global trade in agriculture is three times higher than the world average for all goods (2 per cent in 2013). Exports of food increased more markedly (6 per cent) than exports of non-food agricultural products (3 per cent) according to estimates by World Trade Organization.

Top six exporters of agricultural commodities in the world are European Union, USA, Brazil, China, Canada and India. India leads countries such as Indonesia, Argentina, Thailand and Australia. In 2013, India registered highest rate of growth in agriculture export with 11% rise as compared to previous year. The following graphics give an overview of the trend in global export volumes and major exporters of agricultural commodities for the year 2013.

Figure 1: Global Trend in Agriculture and Food Products

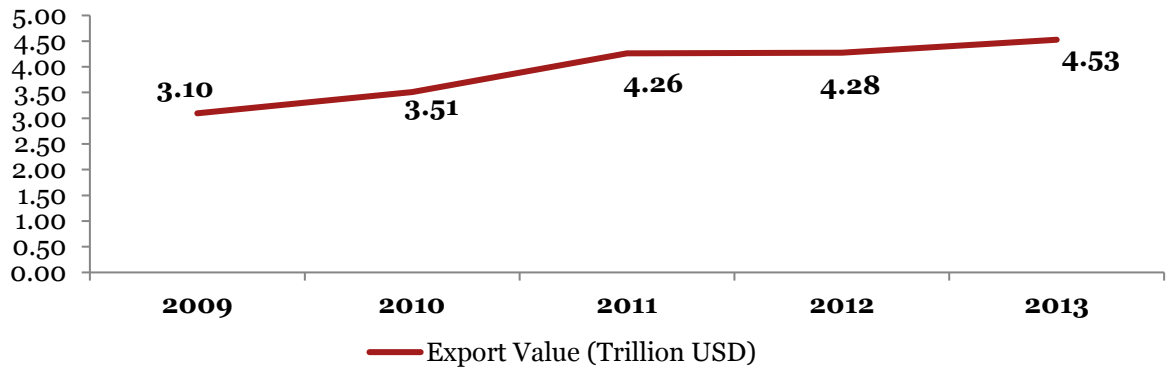
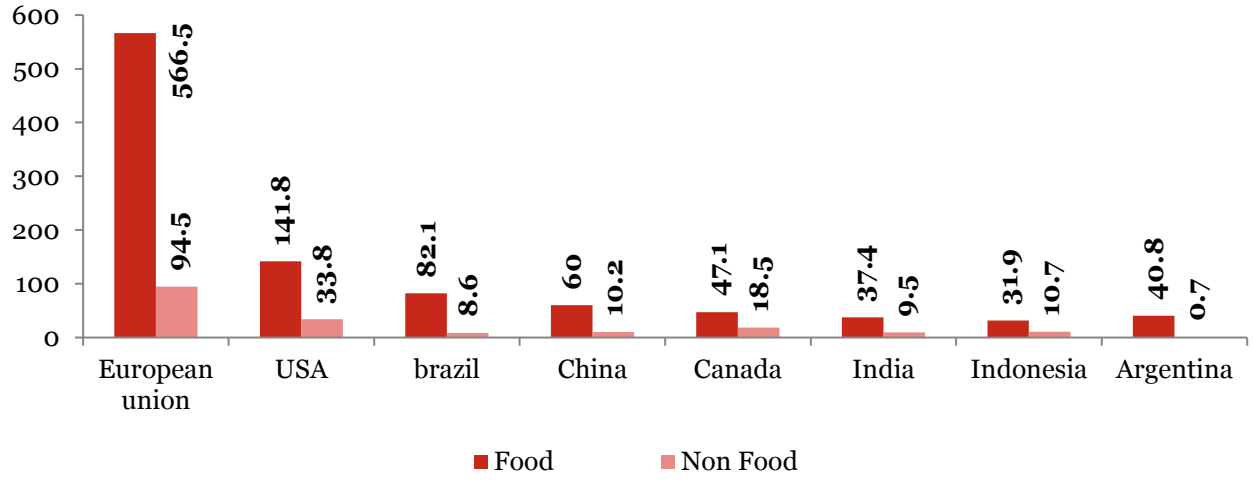


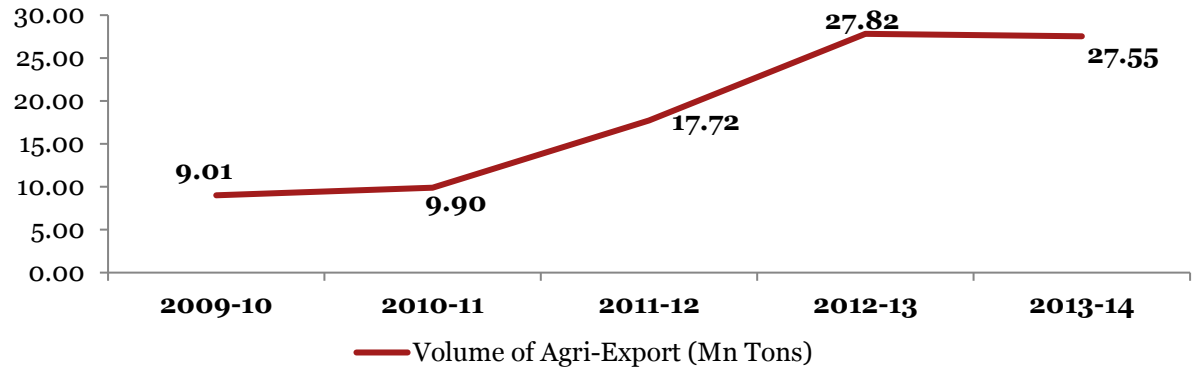
Figure 2: Major Exporter in the World (in Mn Tonnes)



Source: World trade Organization

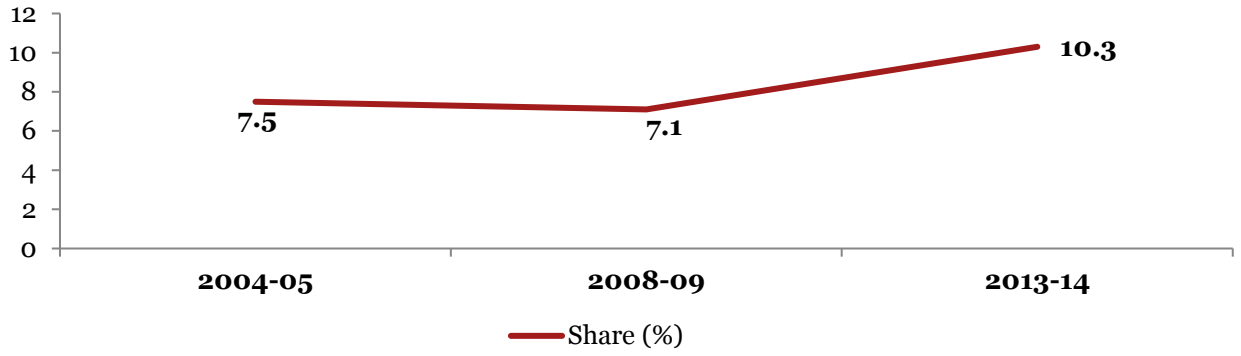
Analysis of the time series data on Indian Export reveals an increasing share of agriculture in the total exports of the country. In the past five years, agricultural export has shown a CAGR of around 32% in terms of volumes exported. However the rate of growth in the value of agricultural export from the country has slowed down. The following figures provide a snapshot of the trend in agriculture and allied exports in terms of volumes exported, share of agriculture and allied products in Indian Export in terms of quantity, value and the rate of growth achieved in past 10 years:

Figure 3: Agriculture Exports from India (in Mn Ton)



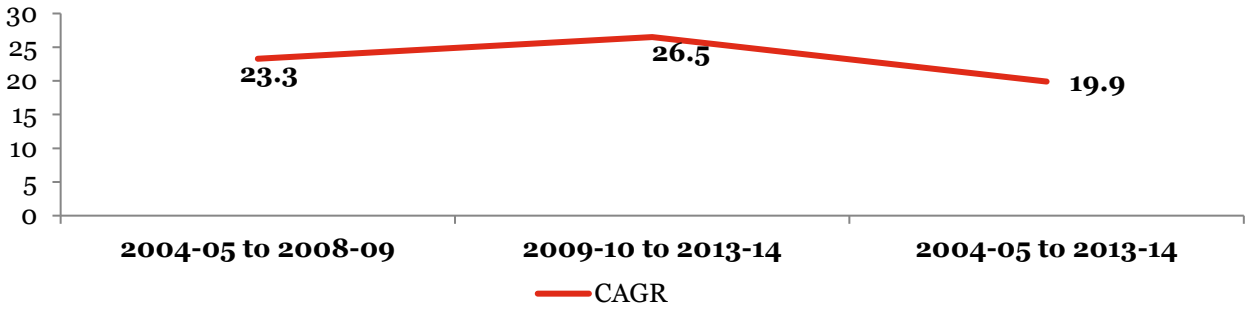
Source: APEDA Agri Exchange

Figure 4: Share of Agriculture and Allied Sector in Total Indian Export



Source: APEDA Agri Exchange

Figure 5: Growth in Agri and Allied Sector Export and CAGR



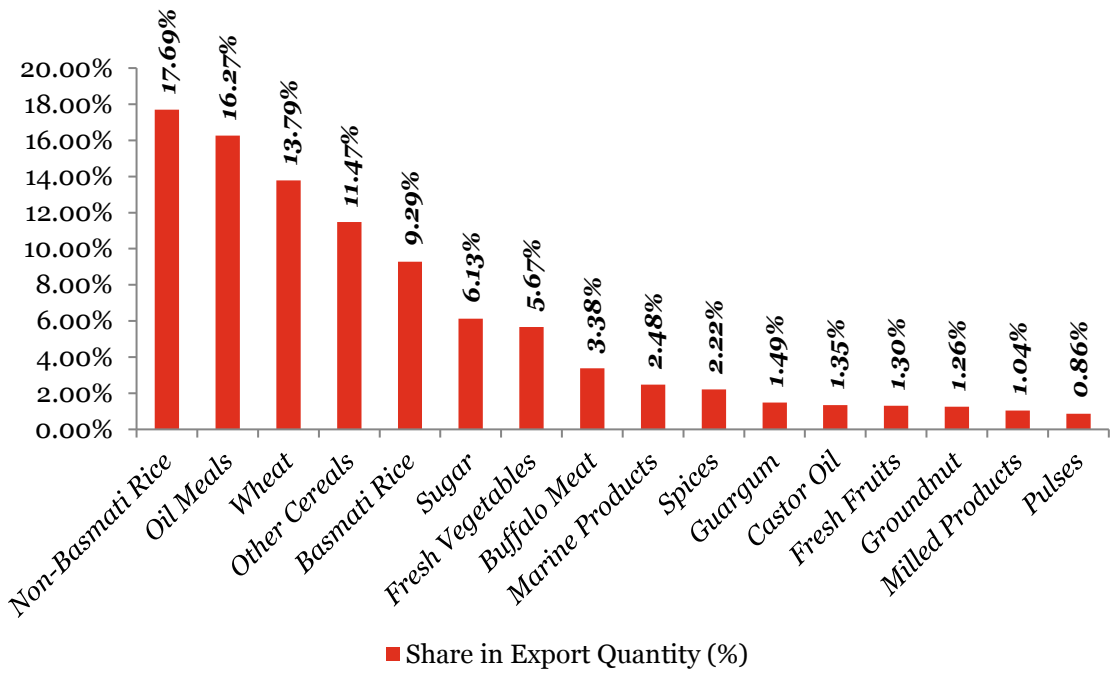
Source: Ministry of Finance, India

Study on identification of export oriented integrated infrastructure for agri products from Punjab, Haryana & Himachal Pradesh - Agricultural and Processed Food Products Export Development Authority (APEDA)

2.3. Major commodities exported

As per APEDA, in 2013-14 Indian agricultural export valued at around USD 39 bn 3 (INR 2,35,988.86 crores) which shows a growth of around 16%. Rice leads the list of exported commodities with oil meals in the second place in terms of quantity exported. Other top commodities constituting the largest section of export from India are wheat, other cereals, basmati rice, sugar, fresh vegetables, buffalo meat, marine products and spices. Share of processed fruits and vegetables has been drastically low in terms of share in total exports. As per the data available from APEDA till November 2014, share of processed fruits, juices and processed vegetables was 2.3% of the total value of exports in the year 2014-15. The low share of processed agricultural products and perishable products such as fruits and vegetables simply states the need for upgrading the existing processing infrastructure in the country. The following graph gives a comparative snapshot of key commodities exported by India:

Figure 5: Major Commodities Exported from India and their share in total agriculture exports from India



Source: APEDA

[3] Conversion done at the exchange rate of 1USD = INR 60

2.4. Major importing countries / Major markets

As per the information sourced from APEDA, export market for Indian agricultural commodities is currently constituted by 218 countries. In terms of quantities imported, Bangladesh occupies the leading position followed by Iran and Vietnam. The table given below enlists the major importing countries of Indian agricultural commodities with their percentage share in the quantity of total agricultural export from India and the major commodities exported to these countries:

Table 2: Major Export markets of India along with the commodities exported

SN	Country	Share in the Exported Quantity (%)	Major Commodities Exported
1	Bangladesh	11.12	Wheat, Non-Basmati Rice, Fresh Onions, Maize, Dairy Products, Cereal Preparations, Other Fresh Fruits, Other Fresh Vegetables, Miscellaneous Preparations, Fresh Grapes
2	Iran	8.33	Basmati Rice, Buffalo Meat, Non-Basmati Rice, Other Cereals, Other Processed Fruits & Vegetables, Maize Groundnuts, Guar gum, Dairy Products, Miscellaneous Preparations
3	Vietnam	5.98	Buffalo Meat, Maize, Groundnuts, Wheat, Alcoholic Beverages, Fresh Onions, Walnuts, Poultry Products, Pulses, Albumin(Eggs & Milk)
4	Indonesia	5.39	Maize, Groundnuts, Wheat, Fresh Onions, Non-Basmati Rice, Milled Products, Miscellaneous Preparations, Guar gum, Poultry Products, Cocoa Products
5	UAE	5.26	Basmati Rice, Wheat, Buffalo Meat, Non-Basmati Rice, Alcoholic Beverages, Sheep/Goat Meat, Other Fresh Fruits, Fresh Onions, Dairy Products, Other Fresh Vegetables
6	Korea	5.10	Buffalo Meat, Maize, Fresh Onions, Groundnuts, Dairy Products, Wheat, Miscellaneous Preparations, Non-Basmati Rice, Basmati Rice, Guar gum
7	Malaysia	4.05	Buffalo Meat, Maize, Fresh Onions, Groundnuts, Dairy Products, Wheat, Miscellaneous Preparations, Non-Basmati Rice, Basmati Rice, Guar gum
8	Saudi Arab	3.81	Basmati Rice, Buffalo Meat, Non-Basmati Rice, Other Processed Fruits & Vegetables, Wheat, Mango Pulp, Sheep/Goat Meat, Dairy Products, Other Fresh Vegetables, Miscellaneous Preparations

SN	Country	Share in the Exported Quantity (%)	Major Commodities Exported
9	Pakistan	3.12	Other Fresh Vegetables, Pulses, Dairy Products, Fresh Onions, Other Cereals, Groundnuts, Fruits & Vegetables Seeds, Buffalo Meat, Cereal Preparations, Maize
10	Benin	2.91	Non-Basmati Rice, Alcoholic Beverages, Jaggery & Confectionery, Basmati Rice, Cereal Preparations, Buffalo Meat, Cocoa Products, Dairy Products, Maize, Miscellaneous Preparations
11	Nepal	2.90	Non-Basmati Rice, Maize, Cereal Preparations, Other Fresh Vegetables, Miscellaneous Preparations, Wheat, Other Fresh Fruits, Dairy Products, Fresh Onions, Jaggery & Confectionery
12	U S A	2.21	Guar gum, Basmati Rice, Casein, Natural Honey , Cereal Preparations, Miscellaneous Preparations, Other Processed Fruits & Vegetables, Cucumber and Gherkins(Prepd. & Preserved), Non-Basmati Rice, Cocoa Products
13	Thailand	1.92	Buffalo Meat, Groundnuts, Wheat, Fresh Grapes , Fresh Onions, Miscellaneous Preparations, Guar gum, Dairy Products, Maize, Fruits & Vegetables Seeds
Source: APEDA Agri Exchange			

2.5. Major origins / states producing export quality products

India has a large production base and diverse agriculture commodities in the categories such as fruits and vegetables. Based on secondary research we have enlisted major agricultural commodities and their major centers of production. The data highlights the potential of various states in production of fruits, vegetables, cereals and animal products.

Table 3: Major Production Centers in India

SN	Category	Commodity	Major Producers
1	Fruits	Apple	Jammu & Kashmir, Himachal Pradesh, Uttarakhand
		Grapes	Maharashtra, Karnataka
		Mango	Andhra Pradesh, Uttar Pradesh, Karnataka, Bihar, Gujarat, Odisha, West Bengal
		Banana	Tamil Nadu, Gujarat, Maharashtra, Andhra Pradesh, Karnataka, Bihar, Madhya Pradesh
		Citrus	Andhra Pradesh, Madhya Pradesh, Punjab, Maharashtra, Rajasthan, Gujarat
		Sapota	Maharashtra, Gujarat, Karnataka, Tamil Nadu and Andhra Pradesh
		Pomegranate	Maharashtra, Karnataka and Gujarat
		Papaya	Andhra Pradesh, Gujarat, Maharashtra, Karnataka, Madhya Pradesh, West Bengal

SN	Category	Commodity	Major Producers
		Pineapple	West Bengal, Assam, Tripura, Karnataka, Nagaland, Manipur
		Gooseberry	Madhya Pradesh, Uttar Pradesh, Tamil Nadu, Gujarat
2	Vegetables	Onion	Maharashtra, Madhya Pradesh, Karnataka, Andhra Pradesh, Bihar, Gujarat
		Potato	Uttar Pradesh, West Bengal, Bihar, Gujarat, Madhya Pradesh, Punjab
		Tomato	Andhra Pradesh, Karnataka, Madhya Pradesh, Odisha, Gujarat, Bihar, West Bengal, Maharashtra
		Peas	Uttar Pradesh, Madhya Pradesh, Jharkhand, Himachal Pradesh, Punjab
		Brinjal	West Bengal, Odisha, Andhra Pradesh, Gujarat, Bihar, Madhya Pradesh
		Okra	Andhra Pradesh, West Bengal, Bihar, Gujarat, Odisha, Jharkhand, Maharashtra, Tamil Nadu
		Tapioca	Tamil Nadu, Kerala, Andhra Pradesh, Karnataka
		Drum Sticks	Andhra Pradesh, Tamil Nadu, Karnataka, Kerala
		Cabbage	West Bengal, Odisha, Bihar, Gujarat, Assam, Madhya Pradesh, Jharkhand
		Cauliflower	West Bengal, Bihar, Madhya Pradesh, Odisha, Gujarat, Haryana, Assam, Jharkhand
		Cucumbers	Andhra Pradesh, Karnataka
3	Other Agricultural Commodities	Cereals	Rajasthan, Karnataka, Maharashtra, Andhra Pradesh, Uttar Pradesh, Madhya Pradesh, Gujarat, Tamil Nadu
		Groundnut	Gujarat, Tamil Nadu, Andhra Pradesh, Rajasthan, Karnataka, Maharashtra, Madhya Pradesh
		Sunflower	Karnataka
		Pulses	Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Andhra Pradesh, Karnataka
		Rice	West Bengal, Uttar Pradesh, Andhra Pradesh, Punjab, Bihar, Tamil Nadu, Chhattisgarh, Odisha
		Wheat	Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar
		Bajra	Rajasthan, Uttar Pradesh, Gujarat, Haryana, Maharashtra
4	Animal Products	Total meat	Uttar Pradesh, Andhra Pradesh, West Bengal, Maharashtra, Tamil Nadu, Haryana, Bihar, Punjab
		Buffalo Meat	Uttar Pradesh, Andhra Pradesh, Maharashtra, Punjab, Kerala, Bihar, Delhi
		Cattle Meat	Kerala, Maharashtra, Meghalaya, Bihar, Nagaland, West Bengal, Karnataka, Tamil Nadu
		Goat meat	West Bengal, Uttar Pradesh, Andhra Pradesh, Maharashtra, Bihar, Odisha, Rajasthan
		Swine Meat	Uttar Pradesh, Bihar, Nagaland, West Bengal, Assam
		Sheep Meat	Andhra Pradesh, Karnataka, Maharashtra, West Bengal, Jammu and Kashmir, Rajasthan, Tamil Nadu
		Poultry	Andhra Pradesh, Tamil Nadu, Maharashtra, Haryana, West Bengal, Uttar Pradesh
		Egg	Andhra Pradesh, Tamil Nadu, Maharashtra, West Bengal, Haryana, Punjab, Karnataka

SN	Category	Commodity	Major Producers
		Milk	Uttar Pradesh, Rajasthan, Andhra Pradesh, Punjab, Gujarat, Maharashtra, Madhya Pradesh, Tamil Nadu, Bihar, Haryana

Source: APEDA Agri Exchange

3. Identification of crop clusters and surplus availability for exports from Focus States

3.1. Methodology adopted for identification of the potential/focus crop

The focus states covered in this study are situated in the fertile Indo Gangetic plains. Both the Punjab and Haryana plains are well irrigated with water from the Ravi, Beas, and Sutlej rivers. Himachal Pradesh, being on higher altitudes, presents suitable climatic conditions for temperate fruits and vegetables.

Due to availability of fertile alluvial soil and varied agro-climatic conditions in the region, there is an assortment of fruits, vegetables and other agri commodities produced and exported from these focus states. Considering the close geographic proximity, commonality of crops, cropping seasons and harvesting window; and commonality of major domestic trade centers and international exit points, the study has considered the focus states as a single agri-cluster.

The crops in the focus states are identified on the basis of –

- ✓ What crops are being exported from the state
- ✓ Crops in which the state is strongly placed vis-à-vis rest of India
- ✓ Any crop that has small volume but still has reasonable potential for exports
- ✓ Crops that were suggested by the stakeholders have also been evaluated

On the basis of the criteria defined above the potential crops selected from the Focus States are:

- **Fruits:** Apple, Citrus fruits (with focus on Oranges/ Mandarins from Punjab), Exotic fruits and nuts (including stone fruits viz. Peach & Plum, Strawberry, Kiwi and Walnuts)
- **Vegetables:** Peas, Potato and other assorted vegetables (such as Carrots, Chillies/Capsicum, Tomato, cauliflower, etc.)
- **Coarse Cereals:** Barley and Millets
- **Floriculture products:** Cut flowers of Carnation, Chrysanthemum, Gladiolus & Tube Rose; and,
- **Animal Products:** Egg & Buffalo Meat

One or the other Focus States has a considerable share in the overall production of these crops/ products in the country and these crops/products (on an individual basis) also have export potential. These crops also have strong market linkages and high potential for export.

The crops identified on the criteria defined above are vetted with the exporters of agriculture commodities in the Focus States and verified that only these crops hold potential for exports from India.

3.2. Crop wise identification of cluster and exportable surplus available in Focus States

3.2.1. Apples

Apple is a pomaceous fruit from the deciduous tree; Malus domestica of the rose family. Apple is commercially the most important temperate fruit and is fourth among the most widely produced fruits in the world after banana, orange and grape.

In 2013-14, 80.82 million metric tons (Mn MT) of apples were produced globally (FAO, 2013). China, US, Turkey and Poland are the major apple producers in the world. According to a recent report by US-FDA, world production of apples in the marketing year 2014/15 is forecasted to decrease slightly from last year to 70.8 Mn MT, with declines in production volumes in China and Turkey. Global trade is also expected to decline more than 5 percent primarily as a result of Russia's ban on fruit from certain countries. India ranks 7th in terms of apple production (by volume), representing almost 2% of the global production (FAO, 2013).

Almost 83% of the global production is consumed domestically in fresh/raw form in the base countries. Value addition is restricted to an average of 11% at the global level and only 7% of the fresh produce is traded in the international market (Refer **Annexure 1.2.1** for more details).

In 2013-14, 8.30 Mn tonnes of apples were traded globally, with an overall export value of 7940 Mn USD. China, United States and Chile were the major exporters of apples (in terms of volumes) in the world. Table 4 gives details on annual export quantity and the share of each country in the total global trade in 2013-14. India ranked 28th on the global level contributing less than 1% of the global trade in volumes.

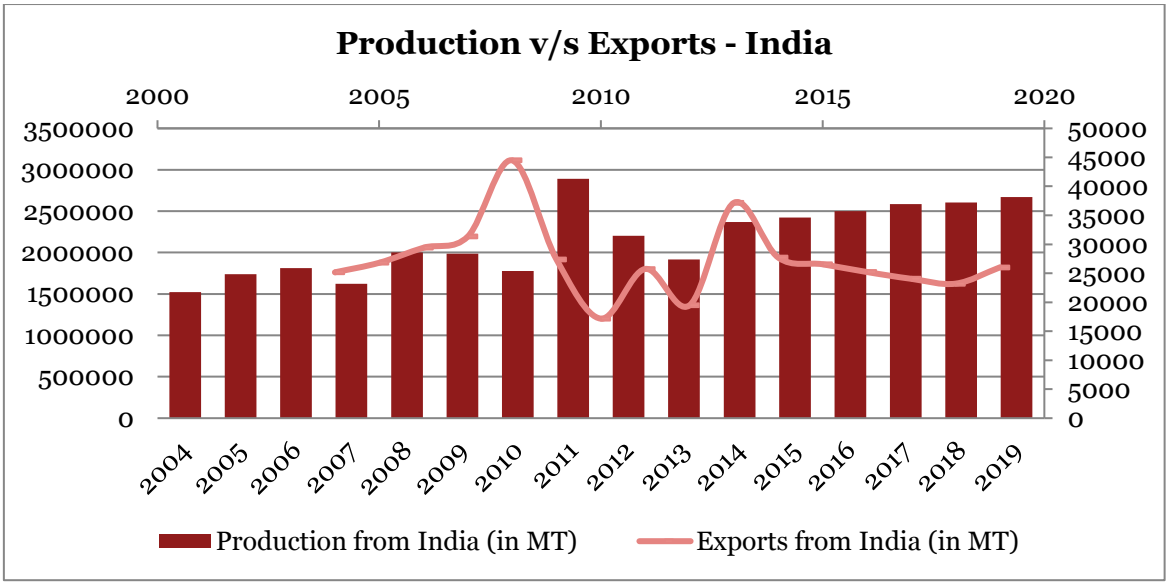
Table 4: Major Apple Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	Poland	1.22	15%
2	China	0.99	12%
3	USA	0.89	11%
4	Chile	0.83	10%
28	**India**	**0.04**	**0.48%**

Source: UNCOMTRADE, PwC Analysis

3.2.1.1. Apple Export Potential of India

India is a net importer of apples. It has also been observed that there exists a huge gap in total apple production in the country and the annual average export volumes from India. Only 1.5% of the total country's production is exported. Figure below depicts the current and projected production and subsequent export volumes from the country.

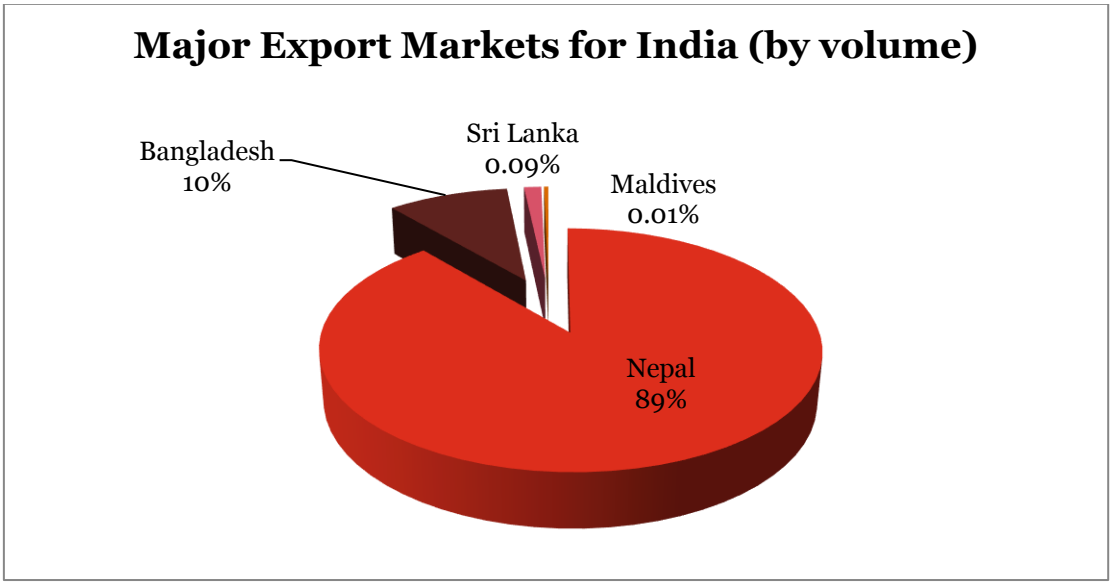


Source: UNCOMTRADE, PwC Analysis

Figure 6: Current and future projections: Production v/s Export volumes from India

3.2.1.2. Analysis of exports from India - Competition Scenario

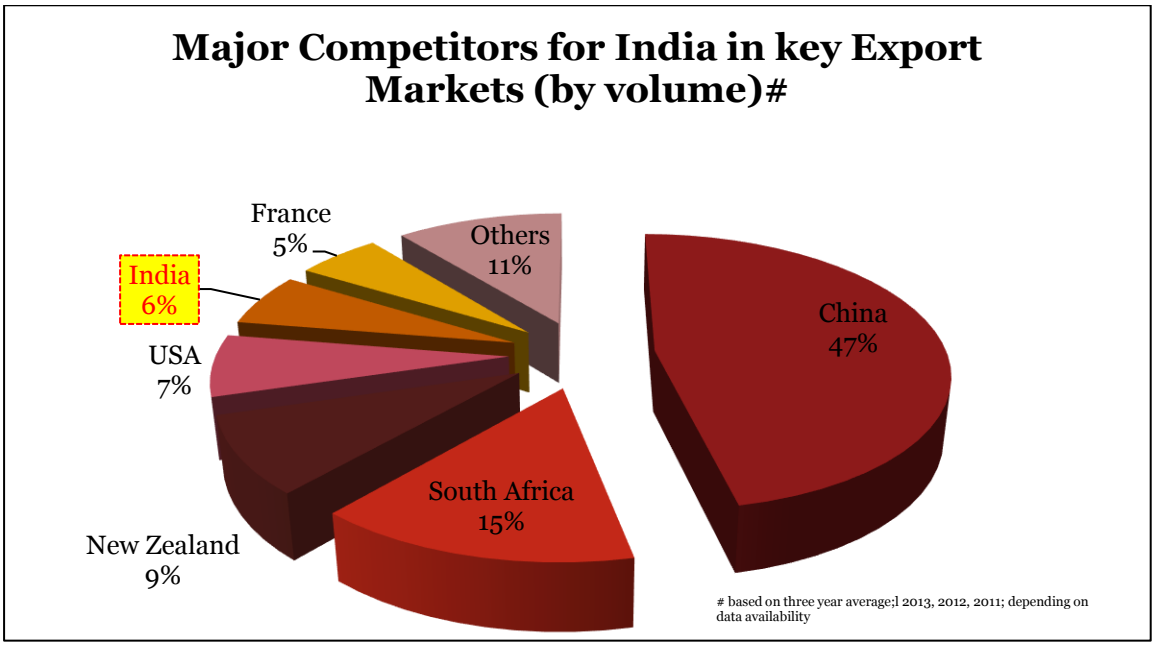
Key export destinations for Indian apples are SAARC nations. Nepal, Bangladesh, Sri Lanka & Maldives together attract almost 100% of India's apple exports. Based on cumulative averages using past three years' data, following chart represents the distribution of India's apple export volumes in these key markets:



Source: UNCOMTRADE, PwC Analysis

Figure 7: Major export markets for Indian apples

However, in these major export markets, India holds a minuscule share of 6% and faces strong competition from China, South Africa, New Zealand, France and USA. Figure below depicts the competitive scenario and India's market share in its key export markets.



Source: UNCOMTRADE, PwC Analysis

Figure 8: Major Competitors for India in its key export markets

Despite of a significant production base, this weak position of India in its major export markets can be attributed to differences in varietal preferences and seasonal disparities. Nonetheless, it can be concluded that there is a significant potential for India to increase foothold in current export markets. Increasing demand from neighboring countries in west Asia and south-east Asia, coupled with increasing transportation & logistics' cost/unit of export also makes these markets as good initial targets.

3.2.1.3. Projection of Exports

Based on above analysis and figures, Bangladesh, Sri Lanka, Nepal & Maldives offer opportunities for India to boost its overall export potential. This demand side analysis also presents an opportunity window for India to augment its export volumes to more than 50% of its current export quantity.

Following methodology was adopted to project the exportable surplus from India and the contribution of the Focus States to these potential export volumes. As part of a developmental plan, the methodology uses a target based approach to assess the available exportable surplus from India and in turn, from the Focus States.

Step 1 – Assessing export potential for India in the prospective markets

Average incremental growth rate (AIGR) is used as a measure of probable export potential for India in the select target markets. It is calculated on the basis of further market scope and demand-supply dynamics in the focus markets and the international market on the whole.

Step 2 - Calculating target volumes in the Target Markets/Focus Region

Based on last 7 years' export performance of India in each of these Focus Markets, if the export quantities are projected (using the least square method) then it can be expected that the total export volumes (on the current growth rate) would reach to 22637.20 MT by 2017.

The calculated AIGR (4%) was used to define the target growth rate (43%), which was then applied to these projected export volumes to calculate targeted export volumes.

The targeted export volumes for India were estimated as 54855.62 MT by 2017 and the incremental volumes were 30811.62 MT.

Step 3 – How much of these targeted export volumes will come from Himachal Pradesh

The incremental volumes (targeted – projected) were allocated to Himachal Pradesh in ratio of its current share in India's production base. It has been assumed that production and export volumes for a given state are directly proportional – higher the production volumes; higher is the state's share in national export volumes.

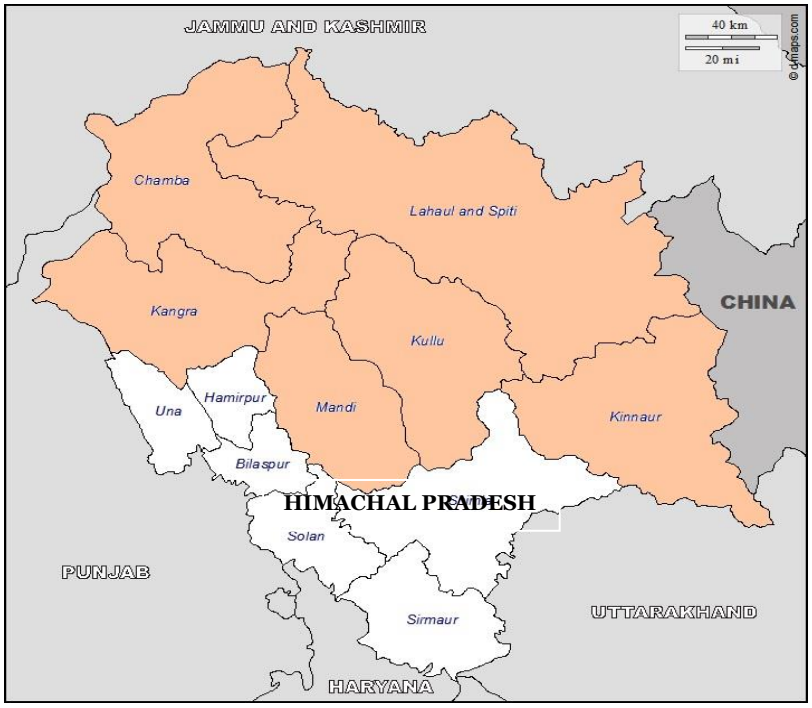
Himachal Pradesh currently produces 30% of the national production. 30% of incremental volume of 30811.62 MT was calculated as 9243.48 MT and the total export potential for Himachal Pradesh was estimated at 9200 MT (by rounding off) by 2017.

Step 4 - Is this estimation reasonable

J&K & Himachal Pradesh together account for almost 90% of India's apple production. The export potential estimations are reasonable considering:

- Current production volumes are used to project exports;
- Exportable surplus is defined considering domestic consumption, wastage and quality requirements for exports;
- Actual exportable quantities are calculated considering India's exports as a percentage of its production
- To arrive at targeted export potential for the Focus States, we have assumed that there are no changes in the production growth rates in the states and that it has remained constant for the said period so as to achieve conservative targets;
- Also, these targets are defined only for 99% of the current export volumes. The y-o-y incremental change in export volumes is not taken into consideration so as to define exports targets on a conservative and yet, realistic basis, leaving ample scope of adjustment in case of demand-supply deviations.

The major apple producing zones in Himachal Pradesh are the northern hilly districts with comparatively cooler climates with crisp and chilly air. Major apple producing districts in the focus region are Shimla, Kullu, Kinnaur, Mandi, Chamba, Sirmour, Lahaul Spiti, Kangra. Following map depicts the identified production clusters for apples in the focus region:



Source: D-maps, PwC Analysis

Figure 9: Major apple producing districts in Himachal Pradesh

3.2.1.4. Crop Specific Recommendations to boost exports

In order to process these exports, one pack house at Kullu is suggested. The pack house will consist of an automatic grading/sorting line and a pre-cooling unit (with storage temperatures of about – 1.10 to 00 C and 85-90% RH). The packhouses will have a capacity of 7200 MT each for the four months of June to September that implies a per day handling capacity of 77 MT.

Apples are mostly consumed fresh but a small part of the production is processed in to juices, jellies, canned slices and other items. It can be seen that the focus region presents a fair mix of both table and processable varieties with some internationally grown and preferred cultivars (viz. Top Red, Delicious Red and Granny Smith) as well. Major varieties grown in the region mostly include mid-season varieties (15) with some late (04) and early season cultivars (02). Major varieties include:

- **Spur types** - Red spur, Starkrimson, Golden spur, Red Chief and Oregon spur.
- **Color mutants -** Vance Delicious, Top Red, Skyline Supreme.
- **Juice making cultivars** - Granny Smith

Therefore, in addition to fresh apple exports, there exist opportunities for fruit pulp (for juices, jams, jellies, squashes) and other value added products. For value addition purposes, a small pulping/juicing unit (of 5 MT/day capacity) is also recommended to achieve higher remuneration for these incremental volumes. This integrated multi juice/pulping unit will also cater to processing requirements of other fruits and vegetables in the region. Alternatively, capacity enhancement of existing pulping & juicing units can also be explored to cater to the proposed requirement.

Issues like blending of apple juice have been highlighted by some state officials. Only juice making cultivar available in India is Granny Smith. Indian Granny Smiths are more sweet than sour, however, international preferred juice making varieties viz. Idared, Jonagored, the Golden Delicious and Gala Royal are slightly sour in taste. Most of these varieties are indigenous to Poland and neighboring countries and therefore, Poland & Germany are the dominant/preferred suppliers for apple juice in the world. Codex also permits such blending to achieve appropriate brix & acidity level; subject to national legislation of the importing country and as long as fruit juice of same kind of fruit is being added (CODEX Standard 247-2005). Therefore, it can be inferred that it is a practice adopted to achieve desired quality & taste as suitable to international taste palate and is acceptable & recognized in the international market.

Concerted efforts are required at the grass root level to boost production and productivity of apple in India. Collar rot (*Phytophthora cactorum*), apple scab (*Venturia inaequalis*), sclerotius blight (*Sclerotium rolfsii*) and crown gall (*Agrobacterium tumefaciens*) are the major diseases reported in apple.

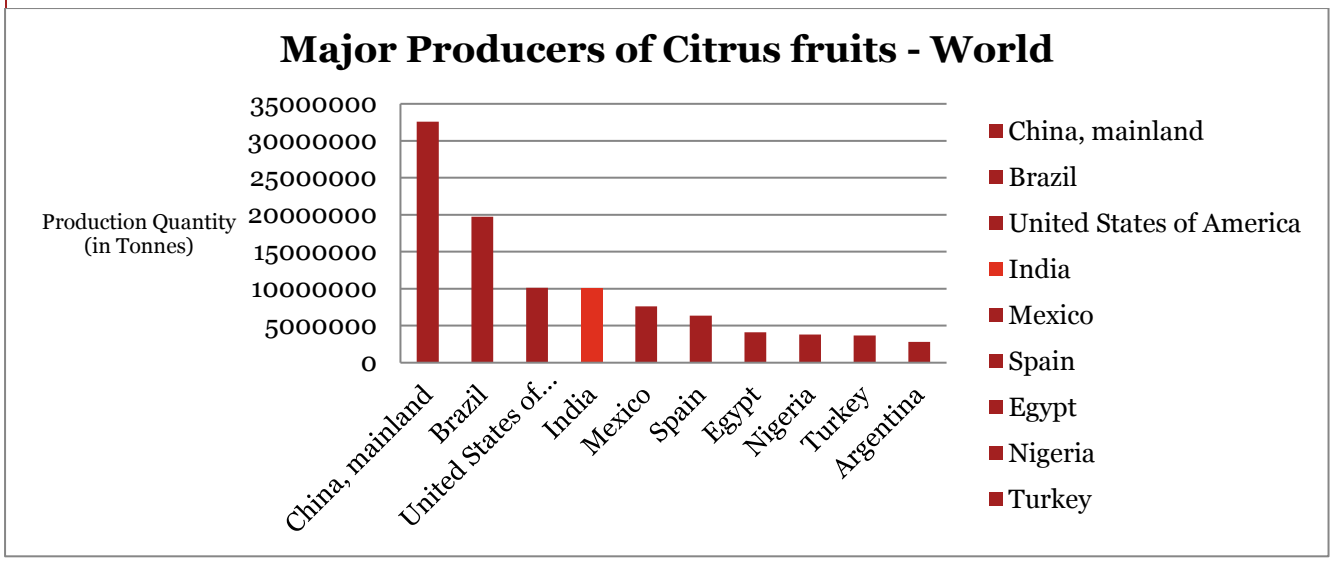
- Development of disease resistant cultivars for internationally preferred varieties, suitable for Indian conditions, should be taken up.
- Disease resistant varieties (such as Prima, Priscilla, Jonafree, Liberty, Freedom, Firdous, Shireen – Scab resistant varieties) should be preferred over traditional varieties.
- Proper maintenance of orchards should be taken up to boost productivity.
- Plants resistant to the diseases should be used for cultivation.
- The infected plant parts need to be destroyed. Application of copper oxychloride, carbendazim, mancozeb and other fungicides have been found to be effective in controlling the diseases.

Export oriented cultivation of apples will help achieve significant surplus for exports without interfering with domestic demand.

3.2.2. Citrus Fruits

Citrus fruits are commercially the most important group of tropical and subtropical fruits in the world. The fruits are rich in vitamin C (ascorbic acid), various fruit acids (especially citric acid), and fruit sugar. The rind, which contains numerous oil glands, and the fragrant blossoms of some species are also a source of essential oils used for perfumes and similar products. Major products include Mandarins, oranges/sweet oranges and lime/lemon, amongst others.

In FY 2013-14, 135.76 Mn MT of Citrus fruits were produced globally. China, Brazil, USA & India contribute to more than 50% of the global production. Figure below shows the major citrus producers in the world and their global positioning in terms of production volumes.



Source: UNCOMTRADE, PwC Analysis

Figure 10 Major Producers of Citrus fruits – World (2013-14)

In FY 2013-14, 4.9 Mn MT of citrus fruits worth 4634 Mn USD were traded globally. Table 5 depicts the major citrus fruit exporters in the world and their comparative standing.

Table 5: Major Citrus Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	Spain	1.57	32%
2	China	0.77	16%
3	Turkey	0.53	11%
4	Morocco	0.43	9%
53	**India**	**0.0011**	**0.02%**

Source: UNCOMTRADE, PwC Analysis

Despite of a strong production base, India's contribution to world trade is miniscule – it ranked 53 with 0.02% share of global trade.

3.2.2.1. Citrus Export Potential of India

Mandarins and sweet orange are two commercially important citrus fruits grown in India. Indian varieties are preferred in international market owing to their taste. Table 6 gives details on distribution of major citrus fruits in India and its comparison to global scenario:

Table 6: Citrus fruits – Production distribution in India

	Global Scenario	National Scenario
Mandarin	13%	44%
Lime & Lemon	10%	28%

Sweet Orange	71%	18%
Others	6%	10%

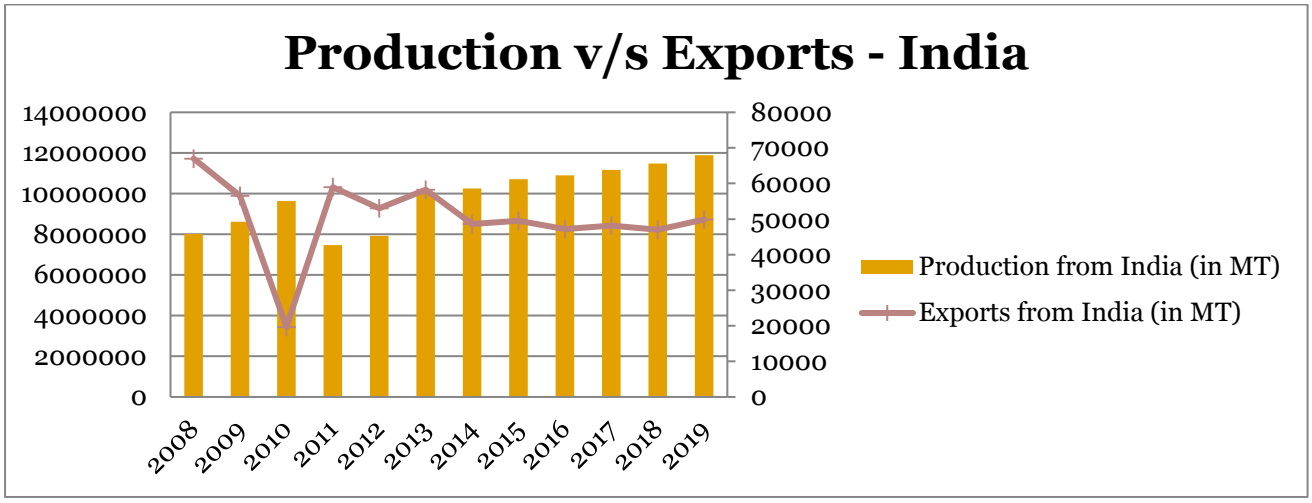
Source: Dept. of agricultural cooperation, GOI, 2011-12

Punjab is ranked 1 in all India Mandarin production and it represents 30% of the national production. Amongst Mandarin varieties, the variety Kinnow has established itself as the lead citrus variety in the Focus State of Punjab. Its productivity of 15 MT/ha is the highest amongst citrus fruits in the country. The demand of this fruit is also increasing in the foreign markets. Thus there is immense opportunity in expanding area under this crop. Many exotic varieties such as many variant selection of Satsuma mandarin from Japan also offer a good scope of diversifying citrus production in the state.

Sweet oranges and Lime/lemon are other fruits in this product category. Sweet Orange is predominantly found in Telangana, Andhra Pradesh and Maharashtra. Nagpur Santra, a variety of Sweet orange from Maharashtra, which also has a geographical identifier to its name. There is limited international trade in Lime and lemons owing to low shelf life, and limited price remuneration. Most of this is consumed in local markets.

3.2.2.2. Analysis of Citrus Fruit exports from India

On an average, India exports less than 1% (0.51%) of its total production of citrus fruits on an annual basis. Production is expected to grow at a CAGR of 2.51% over next 5 years. Consequently, exports are expected to grow at a CAGR of 0.40% to reach 49834 MT by 2019. Figure below depicts the growth in production and exports over a 10 year period and projections for next 5 years.



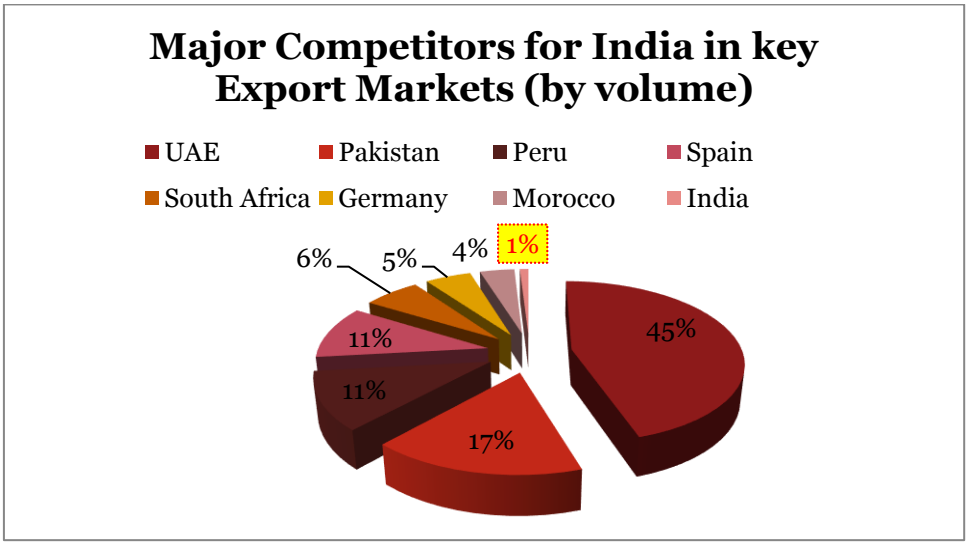
Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 11: Production and Export volume projections for India (5 yrs.)

This gap between production and exports is due to post harvest losses owing to limited storage, processing and transportation infrastructure and high pest infestation.

3.2.2.3. Competition Scenario

Ireland (24%), Kuwait (10%), Oman (9%) & Maldives (4%) are the major export markets for Indian Mandarins[4]. They together represent almost 40% of India's fresh mandarin exports. In its key export markets, India holds a marginal market share (< 1%). It faces strong competition from UAE & Pakistan - UAE alone holds a 45% market share in these export markets, distantly followed by Pakistan with 17% market share.



Source: UNCOMTRADE, PwC Analysis

Figure 12 Major Competitors for India in key Export Markets (by volume)[5]

It can be clearly inferred from above data that there is potential for India is yet to realize its full potential in its key export markets – there is scope to increase India's current market share in these export markets.

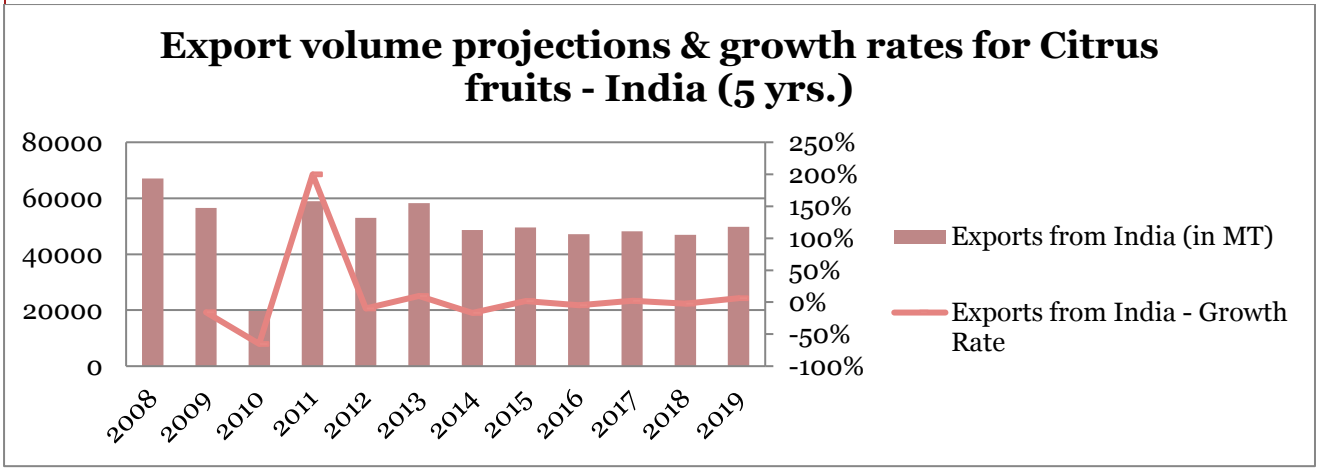
3.2.2.4. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 10 years and, using the least square method, project the same over next 5 years (though it has been fluctuating over the years), we see that Indian Citrus fruit exports are expected to grow at a cumulative CAGR of 0.40% to reach 49834 MT of annual exports in 2019.

Figure below depicts the export trend over the years and projections for next 5 years:

[4] Includes Tangerines & Satsumas
[5] Based on past 3 years' data, depending on data availability



Source: UNComtrade, PwC Analysis

Figure 13 Export volume projections and growth rate for Citrus Fruits from India based on linear forecasting (5 yrs.)

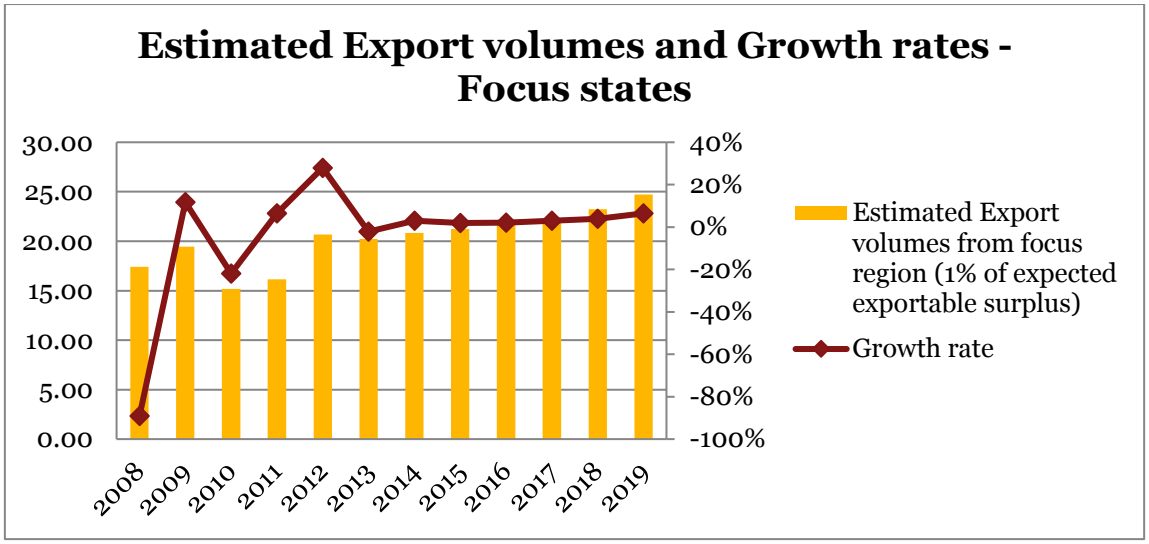
How much from Focus States –

Punjab is ranked 5th after Telangana, AP, Maharashtra, & Madhya Pradesh in the production of citrus fruits in the country and represents a total of 9% of the national citrus production. However, it is ranked no. 1 in Mandarin production in the country and represents 30% of the total Mandarin production of India.

In order to estimate the contribution of Focus states in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 24,725 MT by 2019 from the focus states of Punjab, Haryana & Himachal Pradesh.

Figure below depicts the estimated export volume projections for next 5 years and the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

Figure 14 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

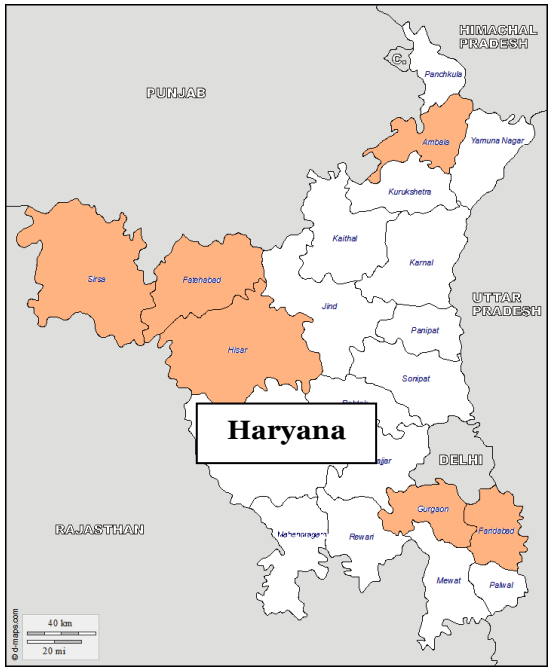
1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 5 year period
2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

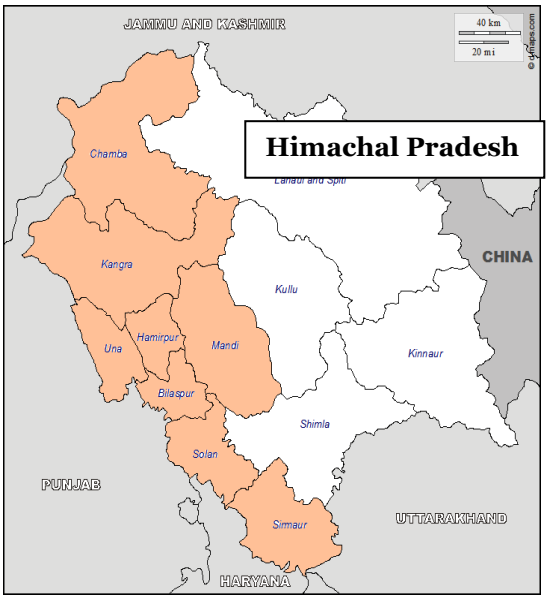
Based on these assumptions, it is projected that the export of Citrus fruits (majorly Mandarins) from the Focus States is about 25,000 (rounded off) tons only.

The cluster to be covered consists of the following districts in the respective states:

1. **Punjab:** Firozepur, Muktsar, Bathinda
2. **Haryana:** Sirsa, Fatehabad, Hisar, Gurgaon & Faridabad
3. **Himachal Pradesh:** Chamba, Una, Kangra, Hamirpur, Bilaspur, Solan, Mandi & Sirmaur

Figure below depicts the major production clusters in each of the Focus States.





3.2.2.5. Crop Specific Recommendations to boost exports

In order to process these exports, considering the expected incremental throughput per day, 2 packhouses of installed capacity/day of 60 MT in key Focus states (in terms of volume) of Himachal Pradesh & Punjab are recommended. The pack house will consist of an automatic grading/sorting line and a pre-cooling unit (with storage temperatures of about – 1.10 to 00 C and 85-90% RH). For imparting uniform yellow-orange colour to the fruits, a de-greening chamber (temperature of 6-7°C, 5-10 ppm of ethylene and 90-95% RH) is recommended. Mandarins can be stored at 5- 7°C with 85-90 % RH for 4-8 weeks in a cold storage.

These pack houses will also cater to surplus available for Stone Fruits (Peach & Plum), Kiwi, Walnuts and strawberry exports in future from each of the respective Focus States.

Citrus fruits are mostly consumed fresh but a small part of the production is processed in to juices, jellies, canned slices and other items. Most of the processable varieties are grown in the state. Therefore, in addition to fresh Kinnow exports, there exist opportunities for fruit pulp (for juices, jams, jellies, squashes) and other value added products.

However, it has been highlighted by several State Agencies & stakeholders that blending of fruit juice by imported pulp is a major practice adopted in India and this, in turn, dilutes the quality of exported Indian fruit juices/pulps. As is evident from the international trade data, Brazil, USA, Belgium & Netherlands are the top fresh fruit & vegetable juice suppliers globally[6]. The dominance of Brazil in orange juice has been prominent. Southern hemisphere varieties viz. Valencia (King of Juice Oranges), Pera, Naval, etc. are sweeter in taste and less acidic. However, Indian Citrus varieties, primarily Kinnow or Mandarins from Punjab, are hybrid varieties with more number of seeds and greater peel oil content in the skin as compared to the Southern hemisphere varieties. Therefore, blending of juices is done to achieve a desired acidity & sweetness level which is compromised because of the bitter taste of seeds & high acidic content in the peel oil. This is a globally acceptable practice. Even Codex has laid down specific quality standards for such blended juices and allows blending of juice from *Citrus reticulata* and/or hybrids with *reticulata* to orange juice in an amount not to exceed 10% of soluble solids of the *reticulata* to the total of soluble solids of orange juice (CODEX Standard 247-2005; Section 3.1.2 (e)). Therefore, for value addition purposes, 1 dedicated multi juice and pulp unit of capacity 5 MT/day is proposed at Firozepur for processing of Kinnow.

Since Punjab has excess of cold storage capacity (1345 against 1318 required units), it is recommended to utilize an existing cold storage facility to boost exports of Kinnow and other fruits & vegetables from the state.

Concerted efforts are also required at the grass root level to boost production and productivity of Citrus fruits in India. The Kinnow plant has an inherent problem of declining at an early age because of early bearing and tendency for over production. The other major constraints of production are:

- Availability of indexed virus free plant material continues to be the major hurdle
- Large number of insects pests, fungal diseases, viruses and virus like disease continue to pose a serious problem

Export oriented cultivation of Kinnow will help achieve significant surplus for exports without interfering with domestic demand.

3.2.3. Exotic Fruits & nuts

3.2.3.1. Strawberry

Strawberry belongs to the family Rosaceae, genus Fragaria, and is among the most widely consumed fruits throughout the world.

Presently, the Food and Agriculture Organization of the United Nations estimates that the world produces more than 7 million tons of strawberry annually, with China producing 40% of the world's supply. The US is a distant second, followed by Mexico, Turkey, Spain and Egypt, respectively.

[6] *UNComtrade, 2013-14, PwC Analysis*

Globally, less than 1 million metric tons (Mn MT) of strawberry is traded on an annual basis at an average dollar value of 2352 Mn USD[7]. India holds a miniscule share of 0.01% in the global trade, with annual trade volumes of 94 MT.

Following table enlists the major strawberry exporters in the world (based on volumes) and relative positioning of India in global trade.

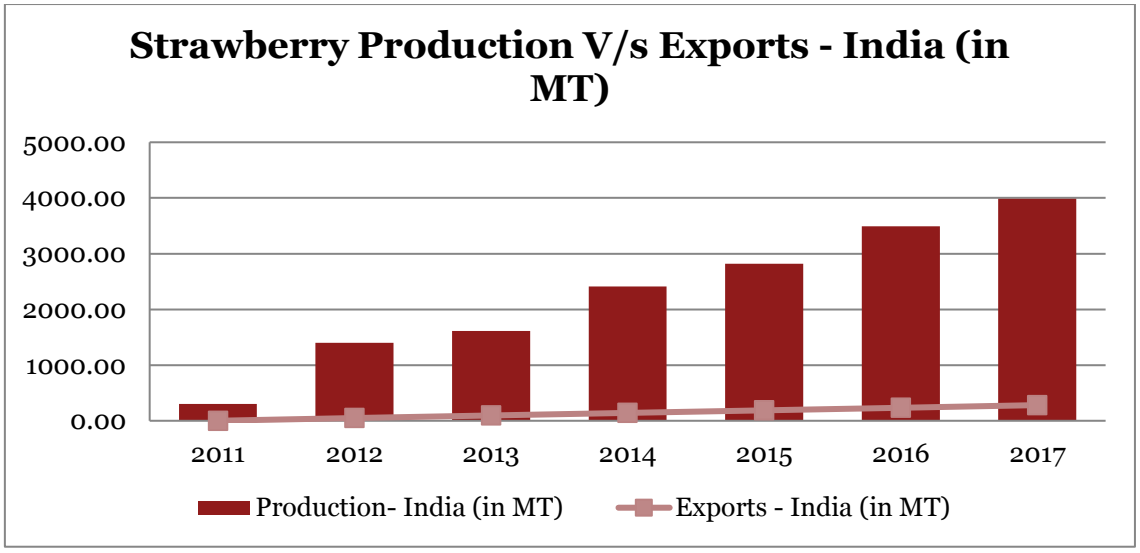
Table 7: Major Strawberry Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	Spain	0.27	32%
2	USA	0.15	18%
3	Mexico	0.11	13%
4	Netherlands	0.06	7%
55	**India**	**0.0001**	**0.01%**

Source: UNComtrade, PwC Analysis

3.2.3.1.1. Analysis of exports from India - Competition Scenario

Almost 85% of the total production is consumed domestically, 10% goes to processing and only 5% is currently exported.

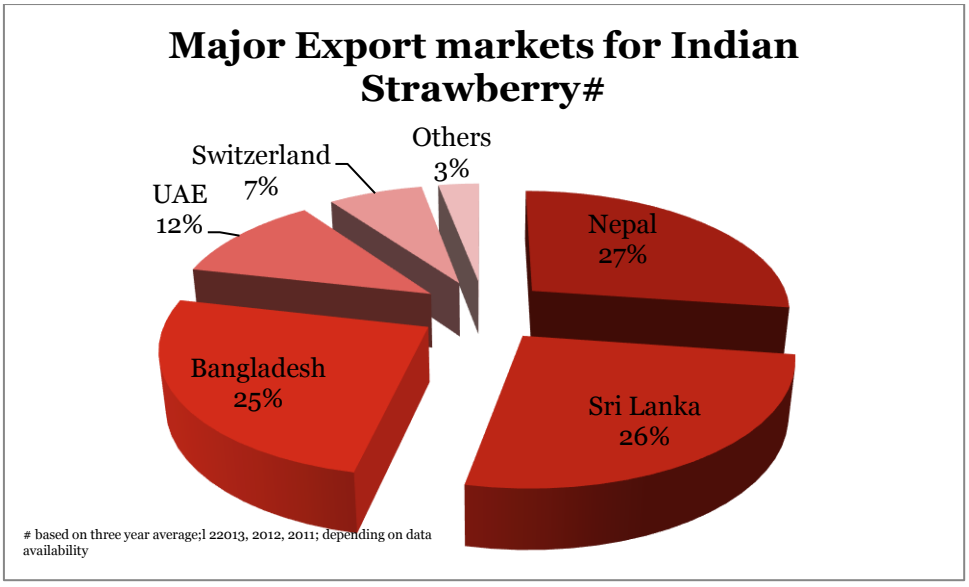


Source: UNComtrade, PwC Analysis

Figure 15: Current and projected strawberry production and exports – India

Major export markets for Indian strawberry are Nepal (27%), Sri Lanka (26%) and Bangladesh (25%). Figure below depicts the percentage distribution of India's strawberry export volumes to its major export markets. Marginal volumes are also exported to Switzerland, UAE, Belgium and France. Exports to Malaysia and Vietnam are also picking up.

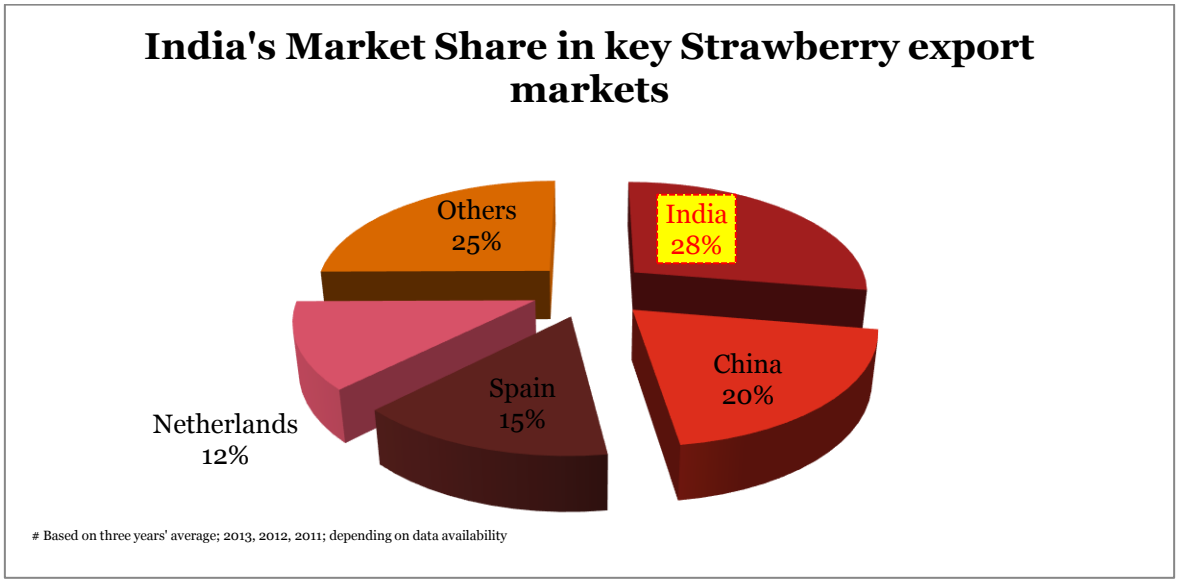
[7]UNCOMTRADE; 2013-14



Source: UNComtrade, PwC Analysis

Figure 16: Major Export markets for Indian Strawberry

India's market share in these export markets stands at 28%, with strong competition from China, Spain, Netherlands and other European nations. Figure below represents the competitive positioning of India in its major export markets.



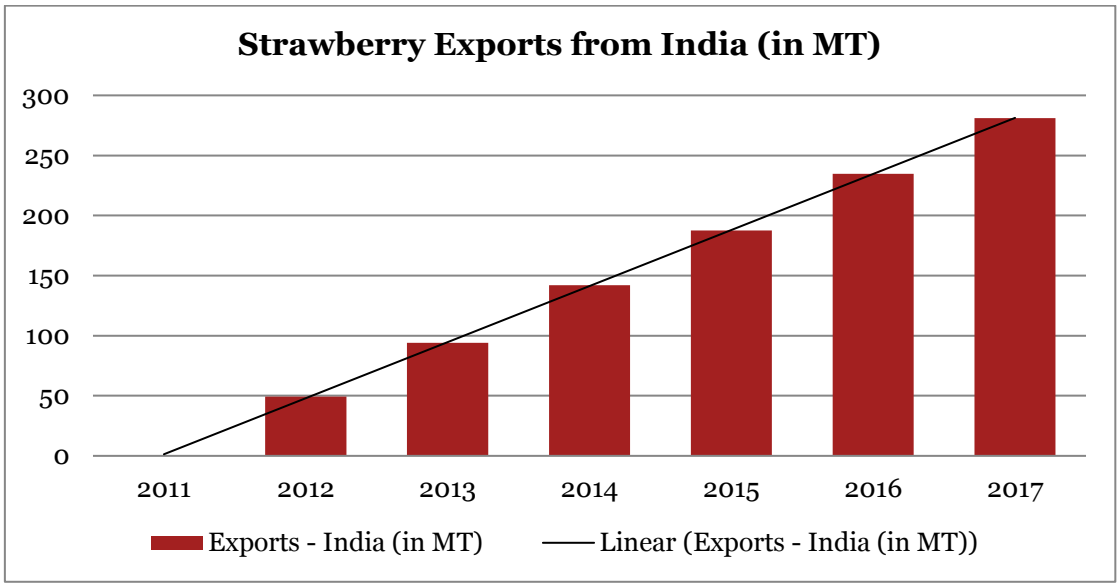
Source: UNComtrade, PwC Analysis

Figure 17: India's market share in its key export markets for Strawberry

If there is significant exportable surplus available, there is a potential to increase India's market share in these markets with an equal opportunity existing to explore newer markets in South East Asia viz. Malaysia, Vietnam and Thailand.

3.2.3.1.2. Strawberry Export Potential of India

Based on projected export volumes for next 3 years, India's export volumes are expected to grow at a staggering CAGR of 183.26%. Figure below depicts this increasing trend in India's strawberry export volumes.



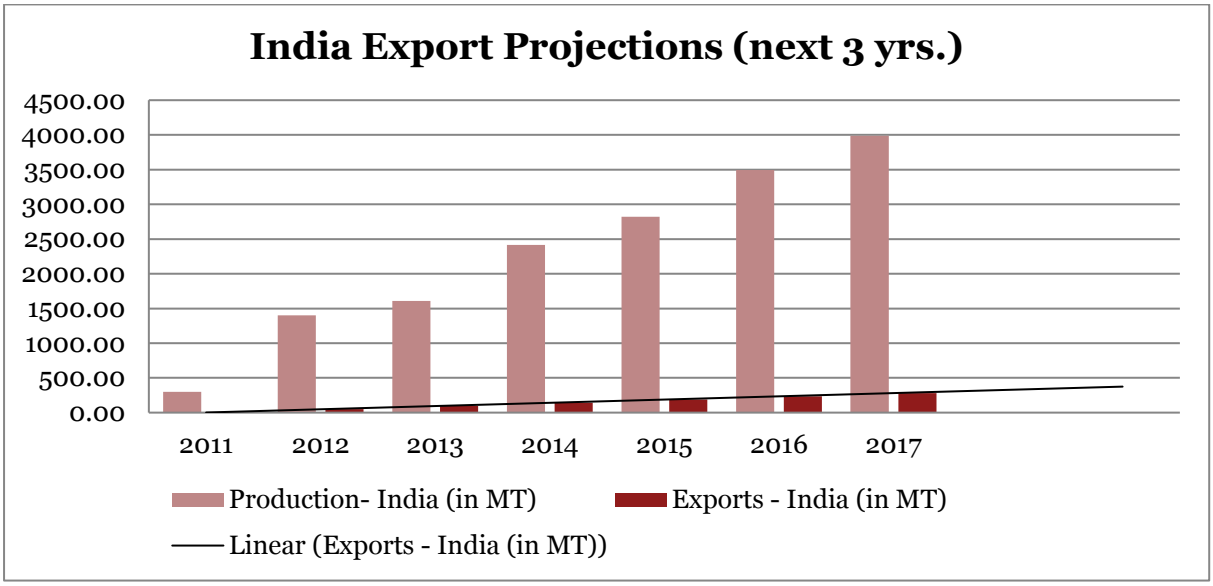
Source: UNComtrade, PwC Analysis

Figure 18: Current and projected strawberry export volumes from India

Approximately 20 varieties are of particular importance to the country, with each varying in their ratio of sweetness and end use. Though India is not known for its strawberries, it nevertheless exports them to other countries. According to the APEDA in New Delhi, the top export countries of Indian strawberries are Bangladesh, Austria, the US, Germany and Jordan. Important strawberry varieties cultivated in India are Chandler, Tioga, Torrey, Selva, Belrubi, Fern and Pajaro. Other varieties include Premier, Red cost, Local Jeolikot, Dilpasand, Bangalore, Florida 90, Katrain Sweet, Pusa Early Dwarf & Blakemore.

India's strawberry season is November through March. During these months, the fruits are available in almost every major city. However, considering the high per unit price and low shelf life of the product, these delicious berries are seldom imported during the off-season.

3.2.3.1.3. Projection of Exports



Source: UNComtrade, PwC Analysis

Figure 19: Current and future projections for Strawberry exports from India

Step 1 - Projecting India's export over next 3 years based on last 3years' performance

Based on last 3 years' export performance, if the export potential for India is projected (using least square method) then it can be expected that the total exports should reach 281 tons by 2017. The key question is how much of this export volume can be achieved by Himachal Pradesh.

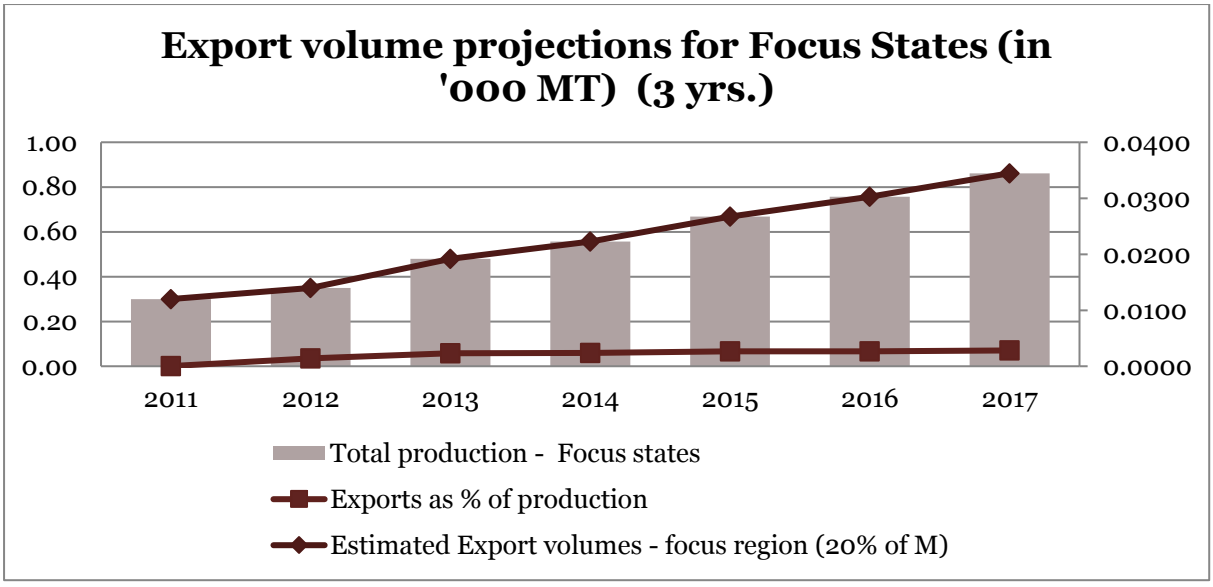
Step 2 – How much of this export volume will come from Himachal Pradesh

Strawberry is commercially cultivated in Himachal Pradesh, Uttar Pradesh, Maharashtra, West Bengal, Punjab, Rajasthan, Haryana, Delhi and the Nilgiri hills. Sub-tropical areas in Jammu also have the potential to grow the crop under irrigated conditions. Himachal Pradesh is ranked 2nd in terms of strawberry production with 30% contribution to national production of strawberries.

Production from the focus states (in this case HP only) is projected for next 3 years based on last 5 years' production performance. This projected production volume is used to calculate the exportable surplus from Himachal Pradesh using Pareto's Principle (80 % of this total production will represent domestic consumption and wastage and only 20% will represent the exportable surplus.

On an average, 5% of total production at national level will represent the actual export volumes from the country. Therefore, on a conservative note, 5% of the exportable surplus from the Focus States is taken as the total expected export volumes from the state.

Based on the calculations, the exports from Focus States are expected to grow at a CAGR of 16% and reach 8.62 MT in 2017. The following graph depicts the total expected export volumes from the Focus States over a period of next three years:



Source: Indiastat.com, UNComtrade, PwC Analysis

Figure 20: Total expected export volumes from the Focus States over next 3 years

Step 3 - Is this estimation reasonable/economically viable

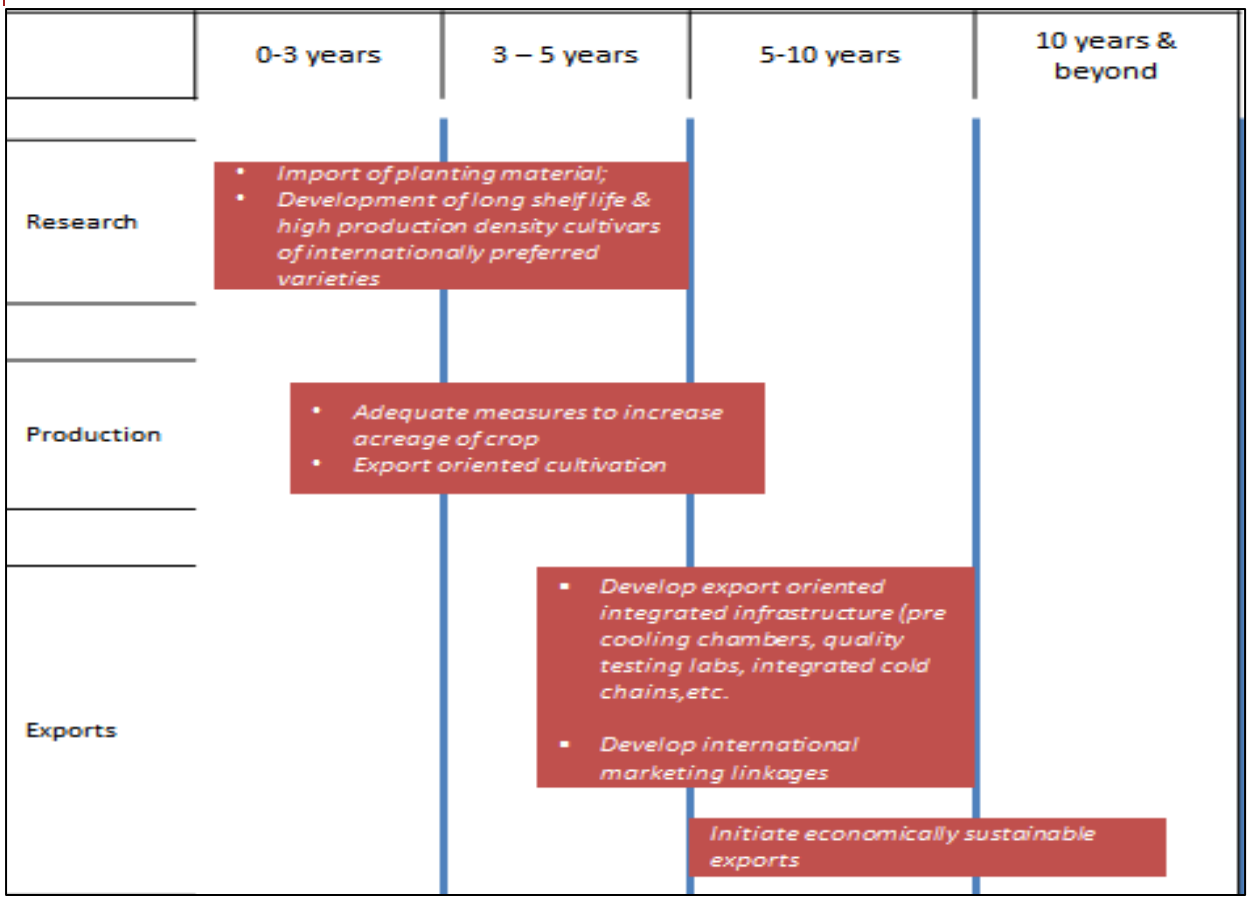
Despite of positive export potential of strawberries from India, these are not economically viable to undertake exports. Following factors restrict exports of fresh strawberries from India:

1. Low shelf life of the produce (lasts only for 5-7 days in refrigerated conditions);
2. Inconsistent quality standards: Phytosanitary restrictions, poor quality of the fruit, which is less sweeter and had a shorter shelf-life that couldn't meet the export standards;
3. Limited harvesting window (Nov. to March). Also, the harvesting season coincides with major global strawberry producers and exporters viz. USA (Florida strawberries), Turkey, Spain and the Netherlands. Strawberry is increasingly becoming an annual crop in these countries where cooler climates are experienced for a major part of the year;
4. Unstable prices for Indian Strawberries in the international market coupled with high per unit transportation costs makes exports a non-viable option for Indian strawberry producers.

Alternatively, most of the farmers are focusing on marketing the fruit in local market rather than exporting. Strong marketing in metro cities has helped producers place the fruit in star hotels, attracting more customers. Rising middle class and increasing purchasing power of consumers have been the major demand drivers.

3.2.3.2. Crop Specific Recommendations to boost exports

There exists a huge domestic demand-supply gap for strawberries. Therefore, initial efforts are required to substantially boost production over a period of next 5 years so as to achieve the required exportable surplus. Production specific interventions are not covered in this report as they are beyond the purview of this study. However, broadly, following interventions are required to boost production and consequently, increase productivity levels and export volumes:



Similar interventions should be replicated at the state level to tap the expected export potential from the Focus States. As discussed in the preceding sections, Himachal Pradesh offers a significant potential for strawberry exports. Substantial investment is required to trigger increased production in the suitable areas. Major strawberry producing clusters needs to be identified and developed as currently the same is being cultivated in small pockets across the state.

Once substantial volumes are available for exports, based on market demand, value addition opportunities such as frozen whole fruits, fruit pulp, fruit shreds (preserved) can also be explored.

3.2.3.3. Stone Fruits

Total global trade in stone fruits comprises majorly of peaches, plums, nectarines and sloes, with some minimal quantities of cherries and apricots.

In 2013-14, 3.16 Mn MT of major stone fruits were traded globally with a value of 5313.40 Mn USD. Spain, USA, Mexico and the Netherlands are the major exporting countries. Table 8 depicts the major exporters of stone fruits and India's position in the global trade of these fruits.

Table 8: Major Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	Spain	0.27	32%
2	USA	0.15	18%
3	Mexico	0.11	13%
4	Netherlands	0.06	7%
55	**India**	**0.0001**	**0.01%**

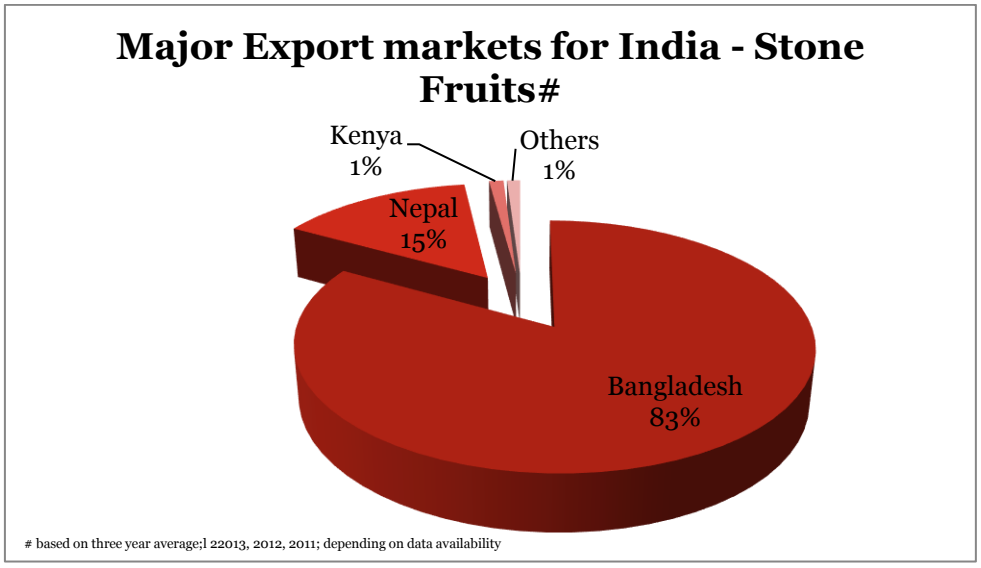
Source: UNComtrade, PwC Analysis

3.2.3.3.1. Analysis of exports from India

India is ranked 9th with less than 2% of global production of stone fruits (includes peaches, plums, nectarines and sloes)[8]. With this negligible production base, its contribution to global trade of stone fruits is also marginal – less than 1% of the global trade share in terms of volumes with an overall rank of 55 (Refer Table 8 for details).

Competition Scenario:

Out of 290 MT of annual exports (2013-14), Bangladesh (83%) & Nepal (15%) together attract almost 100% the total export volumes of stone fruits from India (based on three years' average).

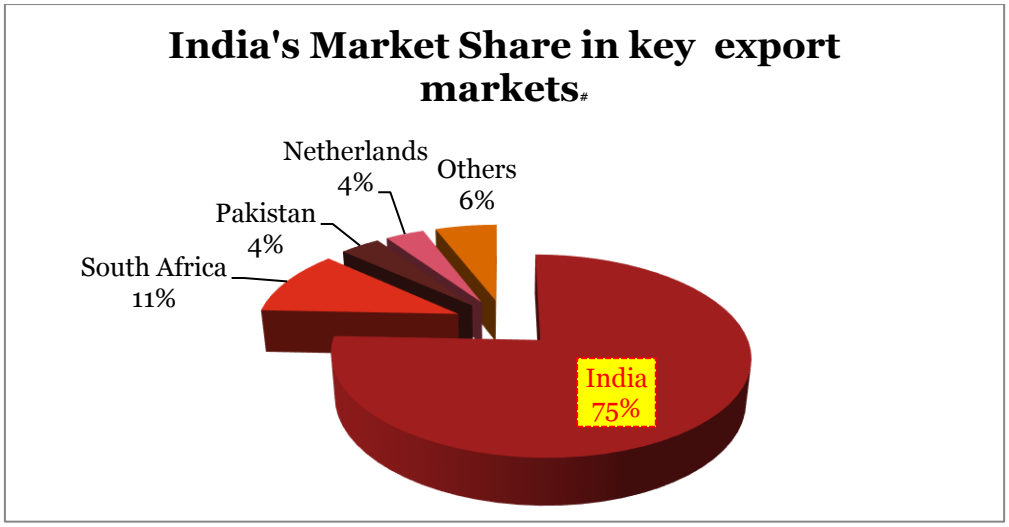


Source: UNComtrade, PwC Analysis

Figure 21: Major Export markets for India – Stone Fruits (Peaches and Plums)

India holds a strong position in these current export markets. It is the top exporter in these export markets with a market share of 75%, and is distantly followed by South Africa (11%). Figure below depicts the competition scenario in India's major export markets for Peaches and Plums.

[8] Source: FAOSTAT, PwC Analysis



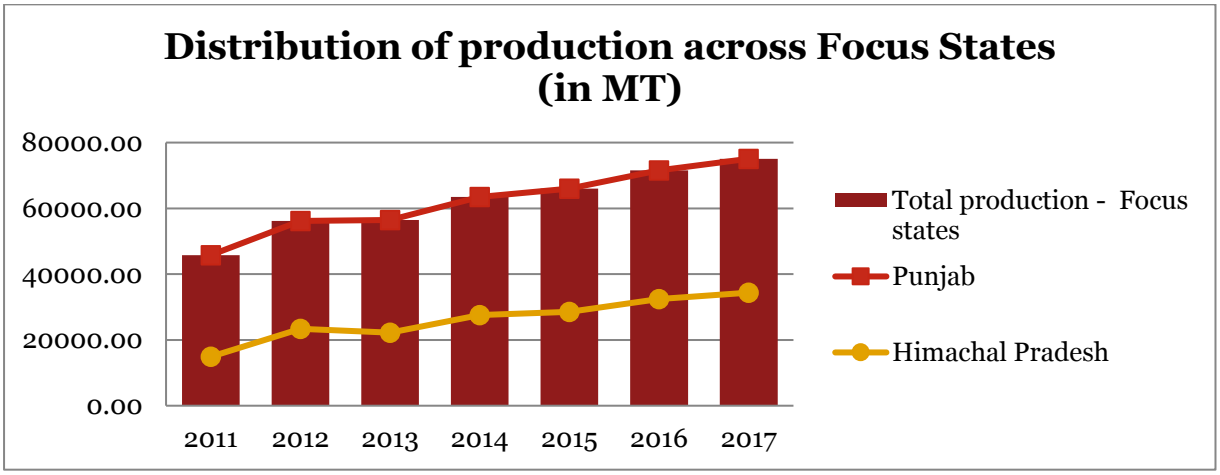
Source: UNComtrade, PwC Analysis

Figure 22 India's market share in its key export markets for Peaches and Plums

3.2.3.3.2. Stone Fruits' Export Potential of India

In FY 2013-14, 94% of the total production of stone fruits in the country comprised of peaches and plums. Also, peaches and plums are promising products with regards to their canning potential and subsequent ability to cater distant markets like Europe & Americas.

One third of the annual production came from the Focus States of Punjab & Himachal Pradesh in 2013-14. Figure below depicts the distribution of production of peaches & plums in the said focus states.



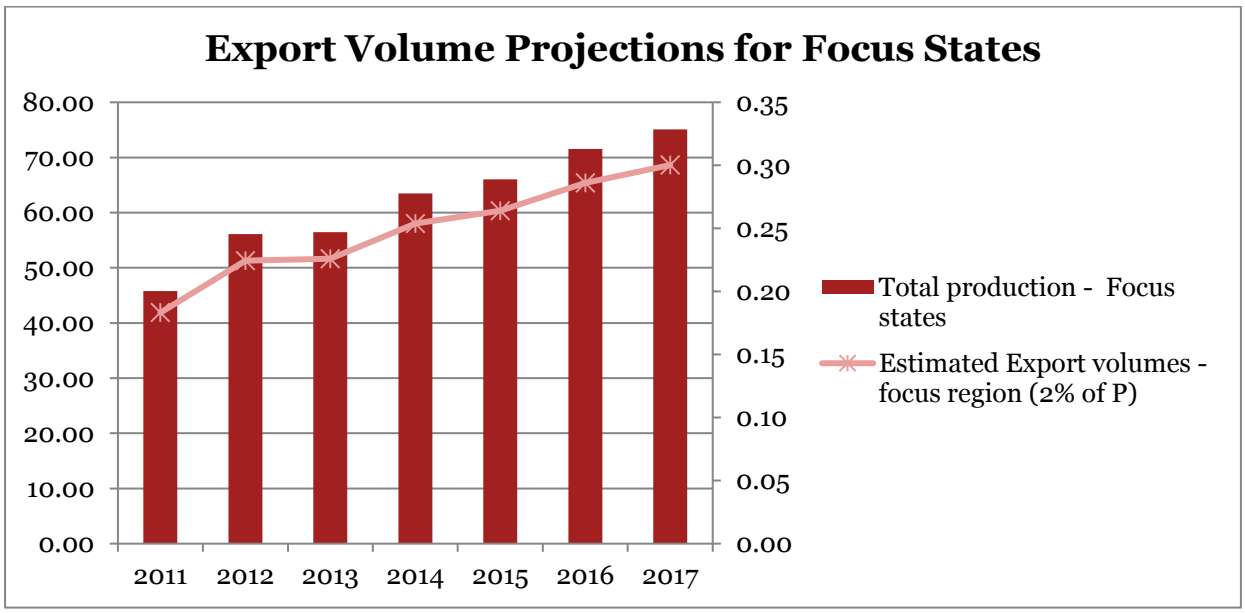
Source: Indian Horticulture Database 2013, www.nhb.gov.in, PwC Analysis

Figure 23 Distribution of production of Peaches & Plums across Focus States

Punjab is ranked 2nd in the production of Peaches and represents 32% of the national production of Peaches. Himachal Pradesh, on the other hand, is ranked 4 representing 7% of the national Peaches' production. Himachal Pradesh and Punjab account for 21% and 5% of the national production of Plums

respectively, with national ranking of 2 & 5 respectively. The other major production centers in India are Arunachal Pradesh, J&K, UP and Nagaland.

The production in these focus states is expected to grow at a CAGR of 8.58% leading to an increase of 9% in the share of focus states in national production from 82% to 91% by 2017. Simultaneously, the exports are expected to reach 300 MT by 2017, recording a CAGR of 7%. Figure below represents the growth in production volumes and the subsequent expected growth in export volumes.



Source: UNComtrade, PwC Analysis

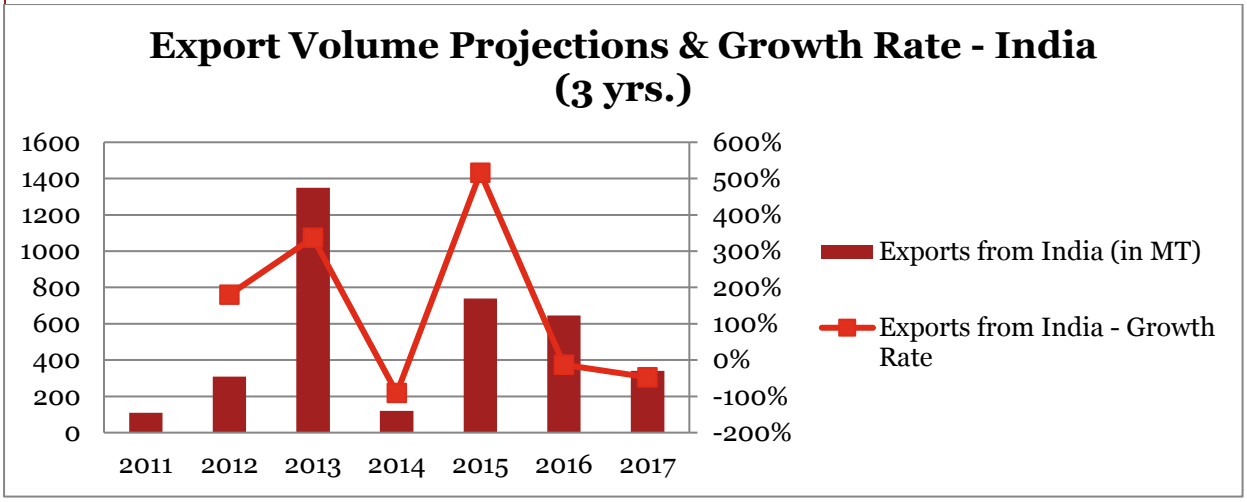
Figure 24 Production and Export volume projections for Focus States

3.2.3.3.3. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 5 years and, using the least square method, project the same over next 3 years (though it has been fluctuating over the years), we see that Indian Stone Fruits' exports are expected to grow at a cumulative CAGR of 20.74% to reach 341 MT of annual exports by 2017.

Figure below depicts the export trend over the years and projections for next 3 years:



Source: UNComtrade, PwC Analysis

Figure 25 Export volume projections and growth rate for Stone Fruits from India based on linear forecasting (3 yrs.)

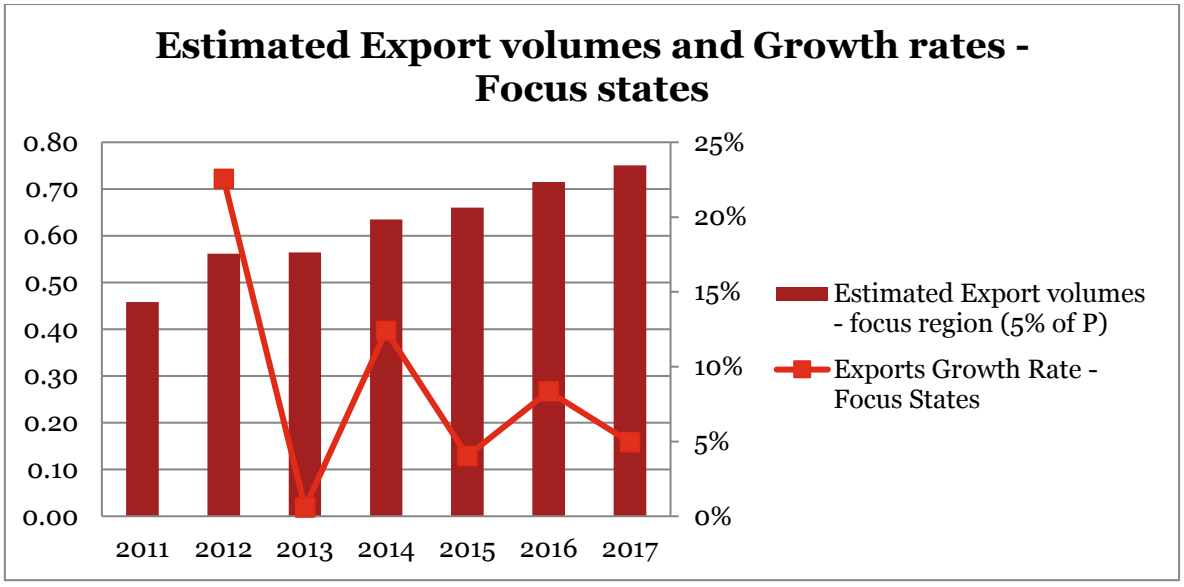
How much from Focus States –

Himachal Pradesh, J&K, Uttar Pradesh & North Eastern Hilly Region are the major Stone fruit producing areas in the country. Amongst the Focus States, Punjab & Himachal Pradesh together represent one-third of national production.

In order to estimate the contribution of Focus states in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 751 MT by 2017 – a cumulative average growth rate of 7% is expected in these focus states of Punjab & Himachal Pradesh.

Figure below depicts the estimated export volume projections for next 3 years with the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

Figure 26 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

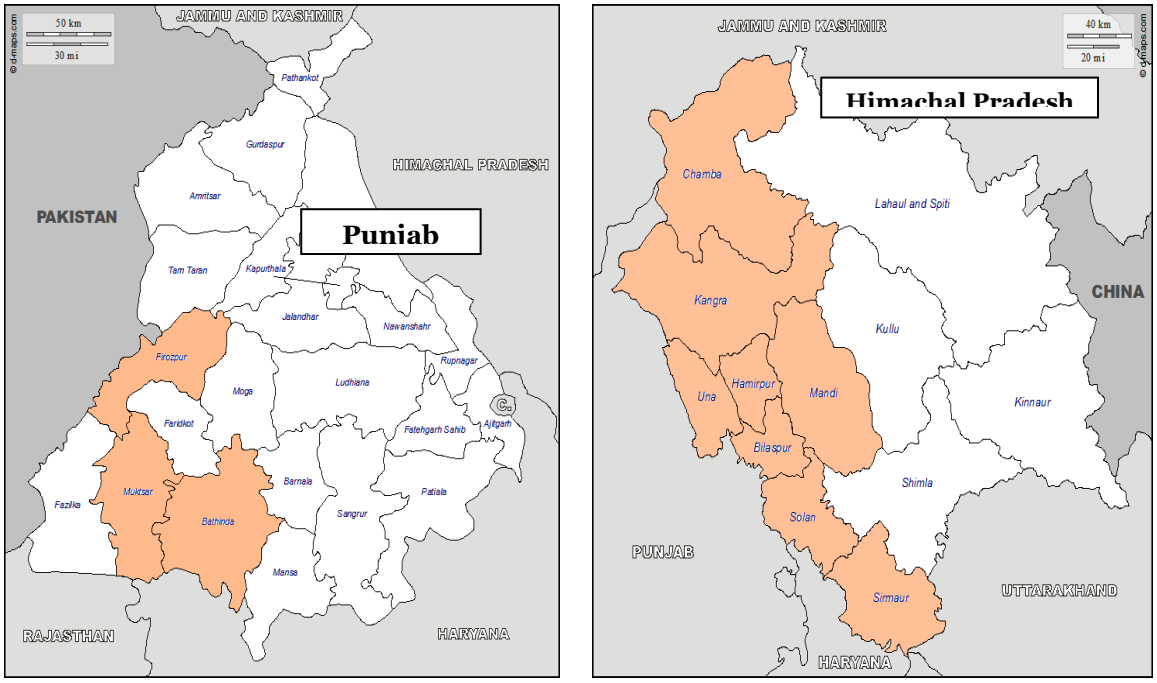
1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 3 year period
2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

Based on these assumptions, it is projected that the export of Stone Fruits (Peaches & Plums) from the Focus States is about 750 tons only.

The cluster to be covered consists of the following districts in the respective states:

- **Punjab:** Firozepur, Muktsar & Bathinda
- **Haryana:** Chamba, Kangra, Una, Hamirpur, Mandi, Solan, Bilaspur, Sirmaur

Below maps depict the major production clusters for Stone Fruits in each of the respective states:



The marketing season for Stone Fruits in this region is July to October with a peak in August – September.

Major Varieties:

Alton, July Elberta, JH Hale, Sharbati, Shan-e-Punjab, Burbankare the major varieties of Peaches grown in the focus states. All Indian varieties are mid-season varieties, with Elberta and JH Hale being preferred varieties for canning and preserving.

In case of Plums, a large number of cultivars (283) have been introduced into the country. European plums performed better in the hills, while Japanese plums are more adopted in sub-mountainous lower elevations. Leading cultivar in the hills is Santa Rosa. In the north-Indian plains small fruited cultivars like Titron, Kala Amritsari, Kelsey, and Alubukhara showed better performance. A good number of low-chilling Florida hybrids (Fla-1-2, Fla 73-4, Fla 85-2, 85-3, Fla 86-4) Sungold, Redgold etc, are under evaluation. Kelsey, Santa Rosa, Titron, Satsuma, Mariposa are the major varieties found in the focus region.

3.2.3.3.4. Crop Specific Recommendations to boost exports

In order to process exports, an integrated pack house (5 MT installed capacity/annum), to be shared with Citrus Fruits and other assorted vegetables, is recommended at Mandi for produce from Himachal Pradesh. Export quantities from Punjab can share the packhouses for citrus fruits. Quantities for processing and preserving (assumed 10% of total exportable surplus) can be processed at multi commodity juicing and pulping units proposed for apples in Himachal Pradesh.

3.2.3.4. Kiwifruit

Over 70% of kiwifruit production is in Italy, New Zealand, and Chile. Italy produces roughly 10% more kiwifruit than New Zealand, and Chile produces 40% less. With these three main production centers, kiwifruit is produced for worldwide consumption roughly all year long.

Exports exceed the amount consumed domestically. New Zealand, Chile, Italy & Greece dominate the 2000 Mn USD of international Kiwi market. The total volume traded amounts to 1.27 Mn Tons a year. Table 9 provides details on the major Kiwi exporters and their global market share in terms of volumes.

Table 9 Major Kiwifruit Exporters in the world (FY 2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	New Zealand	0.36	28%
2	Italy	0.34	27%
3	Chile	0.22	17%
4	Greece	0.10	8%
60	**India**	**0.000006**	**0.0005%**

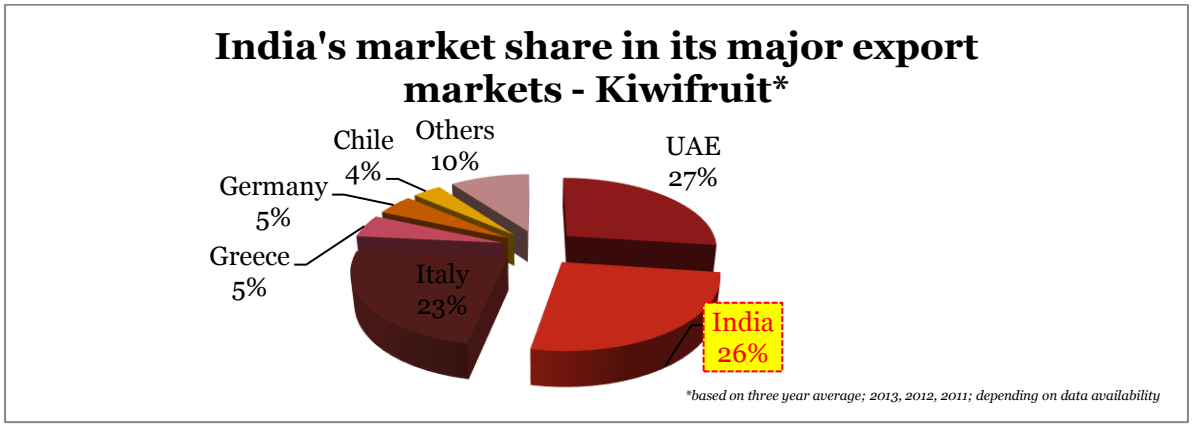
Source: UNComtrade, PwC Analysis

India holds a minor share in the global Kiwi trade, with an overall standing of 60 and less than 1% market share of the total Kiwi trade. Considering India's current standing in global Kiwi export market and increasing demand for the fruit, there exists scope for India to augment its current Kiwi export volumes.

3.2.3.4.1. Analysis of Kiwi exports from India - Competition Scenario

On an average, India exports less than 1% (0.02%) of its total production of Kiwifruits on an annual basis.

Almost 50% of India's total kiwi exports are to Maldives. Poland (33%) and Nepal (17%) are the other major Kiwi fruit export markets for India. India holds a market share of 26% in these export markets, with an overall standing of 2 (preceded only by UAE with a 27.1% market share). Figure below shows the competitive positioning of India in its major export markets.



Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 27 India's market share in its major export markets – Kiwifruit

3.2.3.4.2. Projection of Exports

Based on above analysis and figures, Maldives, Nepal & Poland offer opportunities for India to boost its overall export potential. This demand side analysis also presents an opportunity window for India to double its export volumes.

Following methodology was adopted to project the exportable surplus from India and the contribution of the Focus States to these potential export volumes. As part of a developmental plan, the methodology uses a target based approach to assess the available exportable surplus from India and in turn, from the Focus States.

Step 1 – Assessing export potential for India in the prospective markets

Average incremental growth rate (AIGR) is used as a measure of probable export potential for India in the select target markets. It is calculated on the basis of further market scope and demand-supply dynamics in the focus markets and the international market on the whole.

Step 2 - Calculating target volumes in the Target Markets/Focus Region

Based on last 7 years' export performance of India in each of these Focus Markets, if the export quantities are projected (using the least square method) then it can be expected that the total export volumes (on the current growth rate) would reach to 6000 MT by 2017.

The calculated AIGR (73%) was used to define the target growth rate (162%), which was moderated to 100% as realistic export growth. It was then applied to these projected export volumes to calculate targeted export volumes.

The targeted export volumes for India were estimated as 10400 MT by 2017 and the incremental volumes were 1600 MT.

Step 3 – How much of these targeted export volumes will come from Himachal Pradesh

The incremental volumes (targeted – projected) were allocated to Himachal Pradesh in ratio of its current share in India's production base. It has been assumed that the top two producers together occupy 80% of national production. However, in case of Kiwi it has been observed that 80% of this exportable surplus comes from Himachal Pradesh, primarily because of the type and quality of the varieties grown, the scale of cultivation and easy availability of suitable climatic conditions.

Therefore, we have taken HP's contribution to these incremental export volumes to 50%. 50% of incremental volume of 1600 MT was calculated as 800 MT and the total export potential for Himachal Pradesh was estimated at 1000 MT (by rounding off) by 2017.

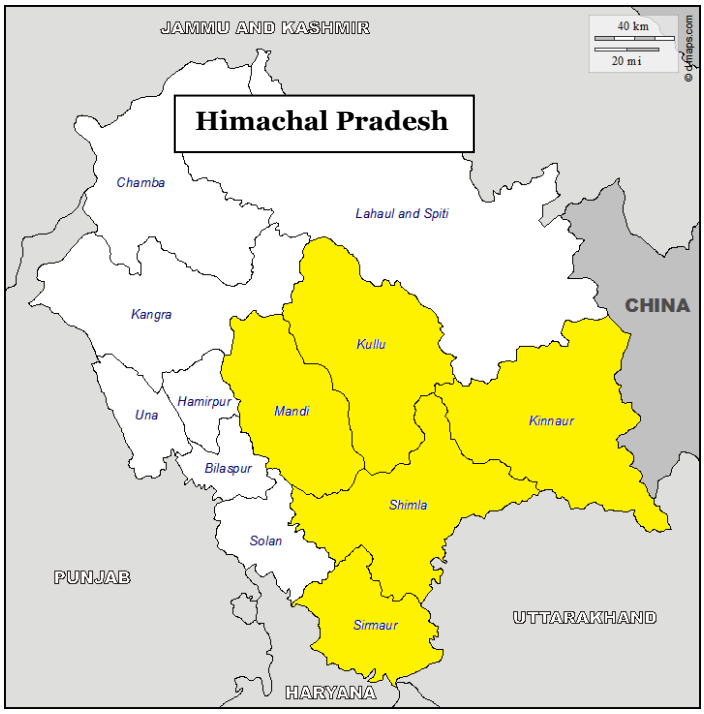
Step 4 - Is this estimation reasonable

Farmers grow several commercial varieties of kiwis throughout many of India's cooler regions, including Uttar Pradesh, Himachal Pradesh, Sikkim, Jammu and Kashmir, Arunachal Pradesh, Meghalaya, and the Nilgiri Hills. Of these areas, Himachal Pradesh produces some of the best kiwis. The export potential estimations are reasonable considering:

- Current production volumes are used to project exports;
- Exportable surplus is defined considering domestic consumption, wastage and quality requirements for exports;

- Actual exportable quantities are calculated considering India's exports as a percentage of its production
- To arrive at targeted export potential for the Focus States, we have assumed that there are no changes in the production growth rates in the states and that it has remained constant for the said period so as to achieve conservative targets;
- Also, these targets are defined only for 99% of the current export volumes. The y-o-y incremental change in export volumes is not taken into consideration so as to define exports targets on a conservative and yet, realistic basis, leaving ample scope of adjustment in case of demand-supply deviations.

The cluster to be covered consists of the following districts in the Focus state of Himachal Pradesh:



This exotic fruit is usually planted in the month of January and February and can be harvested from October to December. Hayward, Abbot, Allison, Monty and Bruno are basically the varieties which are grown in the state.

3.2.3.4.3. Crop Specific Recommendations to boost exports

Kiwifruit offers a good initiative towards crop diversification and is also profitable for the farmers. In few areas of Shimla, Kullu and Mandi districts, farmers are shifting towards Kiwi cultivation as a cash crop due to recent climatic changes. Farmers are even getting support for establishing Kiwi fruit orchards. Serious cultivation efforts have only begun recently on account of growing demand from India's large city centers/ fruit markets of Delhi, Punjab, Mumbai etc. Even in local markets people are earning good as tourists get lured to fresh Kiwifruit purchase.

Kiwi fruits have an excellent keeping quality. The fruits can be kept in good condition in a cool place without refrigeration upto 8 weeks. It can be kept for 4-6 months in a cold storage at -0.60to 00 C. Fruits weighing 70 g. and above are graded as 'A'-grade fruits and between 40-70 g. as 'B' grade fruits.

Grade "A" is export grade. An integrated packhouse at Mandi (to be shared with other fruits and perishables from the region) is recommended to aid proper grading, sorting and packaging of the fruit.

Considering growing Kiwi demand from both domestic and national markets, it is prudent to augment the national production of Kiwifruits in the major production areas. Export oriented cultivation of internationally preferred varieties of Kiwi which are suitable for Indian agro-climatic conditions could boost exports to both current and new export markets. Kiwi season in India would be just the opposite of the Kiwi season in say New Zealand and can be a major opportunity. It is estimated by the New Zealand based Kiwi producers and traders that if proper product protocol is maintained 40% of harvest can be exported as grade A produce and the balance can sold in the domestic market as Grade B. The demand for the fruit in India is also increasing.

A major problem faced by Indian Kiwi exports is quality of the produce and unassured international markets. Training is required for Kiwi growers to establish and maintain a well-formed framework of main branches and fruiting arms. Commercial cultivation of Kiwi in partnership with an international supplier/grower could be utilized to gain necessary skills and expertise for export quality cultivation of Kiwis and also, helps assuring buyers in the international market. The production will be taken up in India with technical support and guidance from the international supplier and the same will then be exported. Buyer network of supplier can also be leveraged. A buy-back arrangement with international super market chains can also be explored simultaneously. Details on such a partnership model and indicative cost estimates are provided in **Annexure 1.5**.

3.2.3.5. Walnuts

Global walnut production for 2014/15 is estimated to rise 10 percent from the previous year to 1.8 million tons, with China and the United States accounting for 80 percent of total output (USDA, 2015).

The total global trade in walnuts amounts to 2756 Mn USD with export volumes of around 0.47 Mn MT/annum. World exports, dominated by the United States and Ukraine, are expected to decrease 4 percent to 495,000 tons (USDA, 2015). India holds a meagre share of 1.57% in the global trade of Walnuts.

Table 10 gives details on top exporters (based on export volumes), export quantity and their share in global trade.

Table 10: Major Walnut Exporters in the world (2013-14)

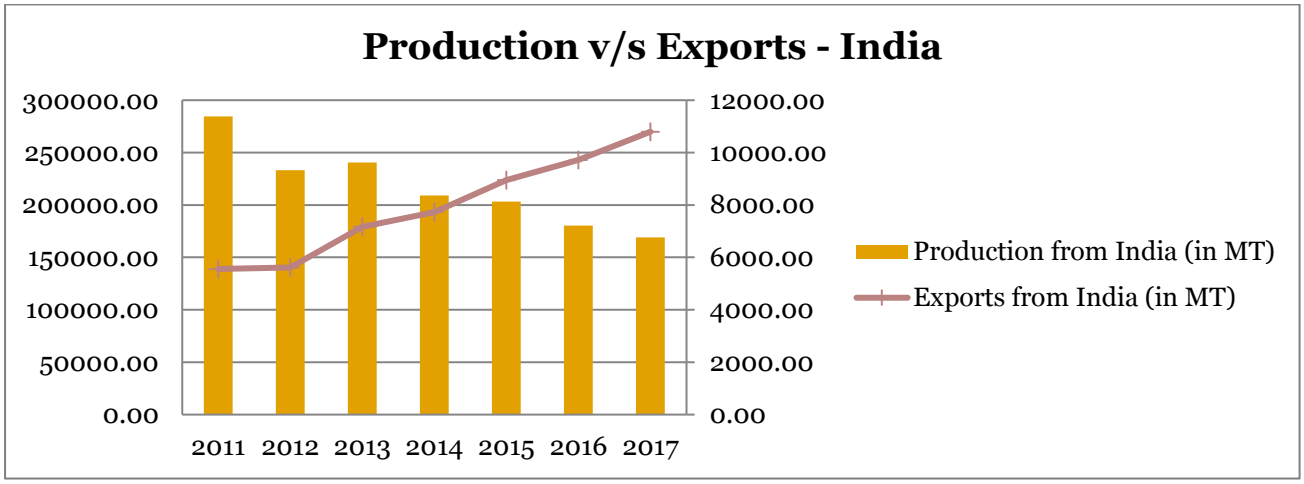
Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	USA	0.23	48.35%
2	Ukraine	0.03	6.57%
3	Chile	0.031	6.64%
4	France	0.02	6.24%
11	**India**	**0.0071**	**1.57%**

Source: UNComtrade, PwC Analysis

3.2.3.5.1. Analysis of Walnut exports from India

On an average, India exports almost 4% of its total annual production of walnuts. Though production in India is expected to decline in coming years, however, a favorable trend is seen for exports. Exports

are expected to grow at a staggering CAGR of 12% to reach 10797 MT by 2017. Figure below depicts the growth in production and exports over a 4 year period and projections for next 3 years.

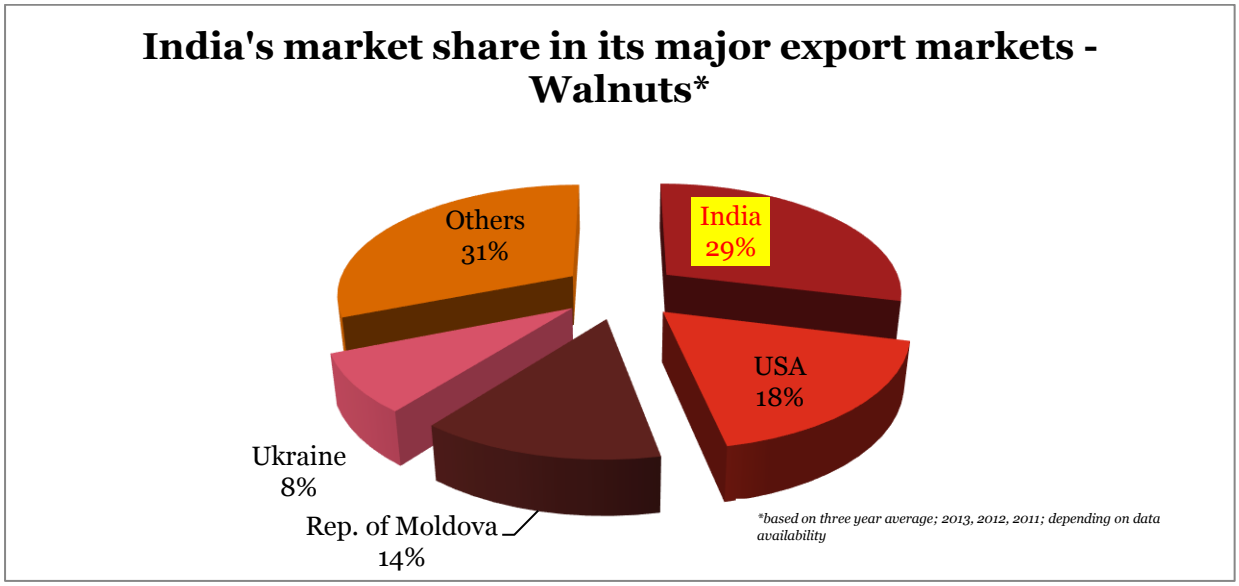


Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 28: Production and Export volume projections for India (3 yrs.)

Competition Scenario:

Egypt (35%), USA (10%), UK (8%) and France (7%) are the major export destinations for Indian Walnuts[9]. India enjoys a 24% market share in these markets. Figure below shows the competitive positioning of India in its major export markets.



Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 29 India's market share in its major export markets – Walnuts

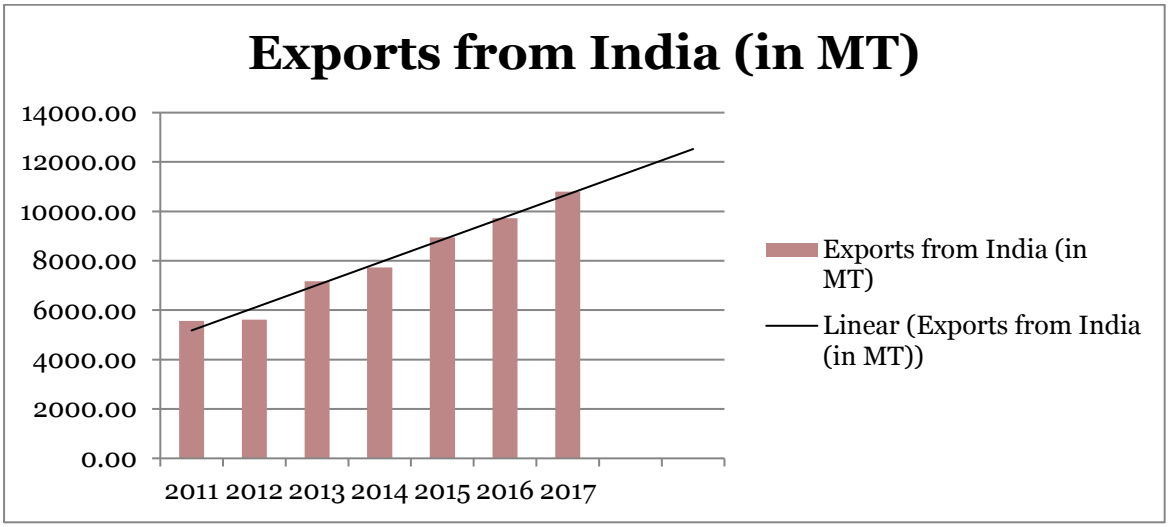
[9] *based on three year average; 2013, 2012, 2011; depending on data availability*
Source: UNComtrade, PwC Analysis

3.2.3.5.2. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 5 years and, using the least square method, project the same over next 3 years we see that Indian Walnut exports are expected to grow at a cumulative CAGR of 11.70% to reach 10797 MT of annual exports in 2017.

Figure below depicts the export trend over the years and projections for next 3 years:



Source: UNComtrade, PwC Analysis

Figure 30 Export volume projections from India based on linear forecasting (3 yrs.)

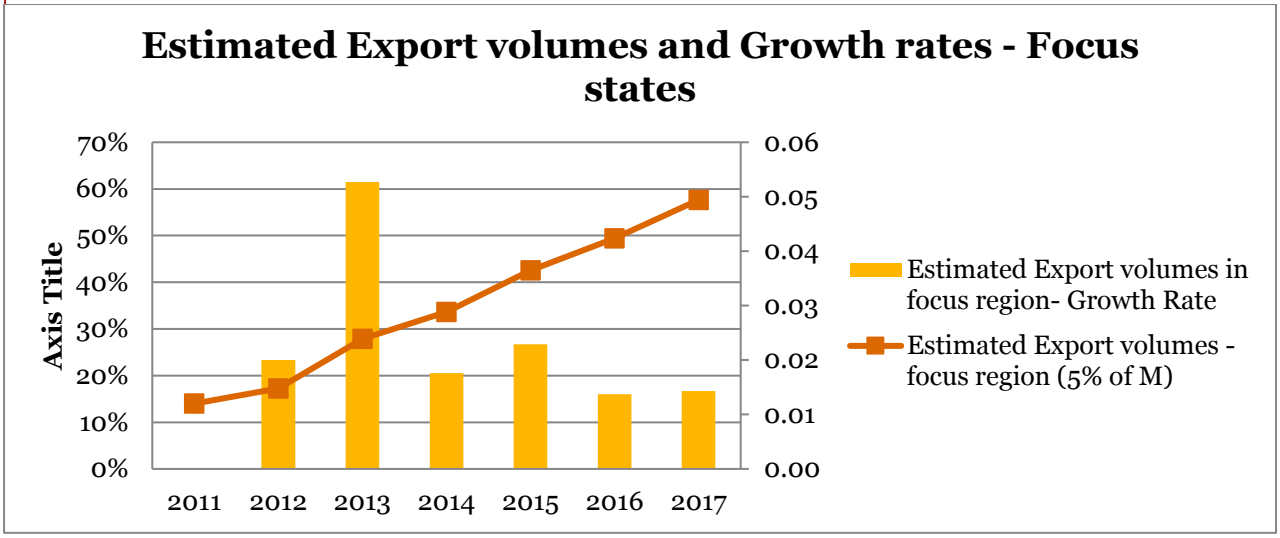
How much from Focus States –

In India, walnuts are grown in Jammu & Kashmir, Arunachal Pradesh, Himachal Pradesh and Uttarakhand. Jammu & Kashmir contributes around 98 per cent of the country's output.

In order to estimate the contribution of Focus states (in this case Himachal Pradesh only) in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 49.41 MT by 2017 – a cumulative average growth rate of 27% is expected in these focus states of Punjab, Haryana & Himachal Pradesh.

Figure below depicts the estimated export volume projections for next 3 years with the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

Figure 31 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 3 year period
2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

Based on these assumptions, it is projected that the export of Peas from the Focus States is about 50 tons (rounded off) only.

The cluster to be covered consists of the following districts within the Focus States:

The marketing season for walnuts in this region starts in September and lasts till January. The major varieties grown include Gobind, Eureka, Placentia, Wilson, Franquetfe and Kashmir Budded.

3.2.3.5.3. Crop Specific Recommendations to boost exports

Lack of high-yielding varieties, long gestation periods, poor orchard management and uneven yields (estimated at 18-50 kg per tree per year) have limited the growth potential of walnut production in Himachal Pradesh. There is an urgent need for the state to adopt end-to-end approach involving production, protection, post-harvest management, processing and marketing.

Based on level of processing required for walnut exports and projected surplus available with Focus States, no dedicated infrastructure is recommended. However, an integrated pack house is recommended to support in quality grading and effective post-harvest management. The required packhouses will be in areas common to other vegetables and fruits in the region.

In addition to exports of shelled and/or in-shell whole walnuts, the state can also explore opportunities for value added products (honey-dipped, sugar coated, fried and salted, baked) at a later stage in future, when production quantities reach adequate levels to cater to both domestic and export demand with substantial surplus available.

3.2.4. Peas

The crop is cultivated for its tender and immature pods for use as vegetable and mature dry pods for use as a pulse. In both cases, seeds are separated and used as vegetable or pulse. Peas are highly nutritive and contain high content of digestible protein (7.2 g / 100g), Carbohydrate (15.8 g), Vitamin-C (9 mg), phosphorus (139 mg) and minerals. Tender seeds are also used in soups. Canned, frozen and dehydrated peas are very common for use during off-season. Like any legume crop, pea is an integral component of sustainable agriculture due to its soil enriching and conditioning properties.

India & China together dominate the global production of peas, with China accounting for 61% of the total production in FY 2013-14. However, due to high domestic demand, most of this production is locally consumed.

The total global trade in Peas amounts to 387 Mn USD with export volumes of around 3 MT/annum. India holds a meagre share of less than 1% in the global trade of Peas. France (15%), Canada (13%), Guatemala (10%) and the Netherlands (9%) are the top exporters of Peas in the world (2013-14).

Table 11 gives details on top exporters (based on export volumes), export quantity and their share in global trade.

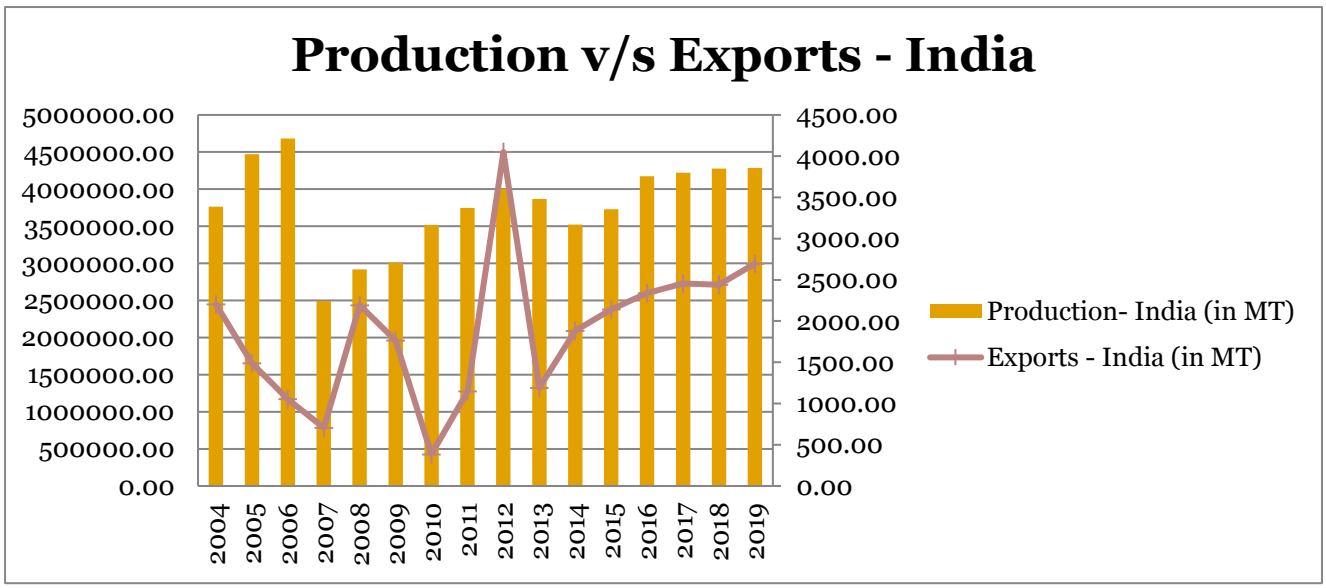
Table 11: Major Pea Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	France	0.05	15%
2	Canada	0.04	13%
3	Guatemala	0.03	10%
4	Netherlands	0.03	9%
25	**India**	**0.001**	**0.38%**

Source: UNComtrade, PwC Analysis

3.2.4.1. Analysis of Peas' exports from India

On an average, India exports less than 1% (0.05%) of its total production of peas on an annual basis. Production is expected to grow at a CAGR of 2.06% over next 5 years. Consequently, exports are expected to grow at a staggering CAGR of 18% to reach 2696 MT by 2019. Figure below depicts the growth in production and exports over a 10 year period and projections for next 5 years.

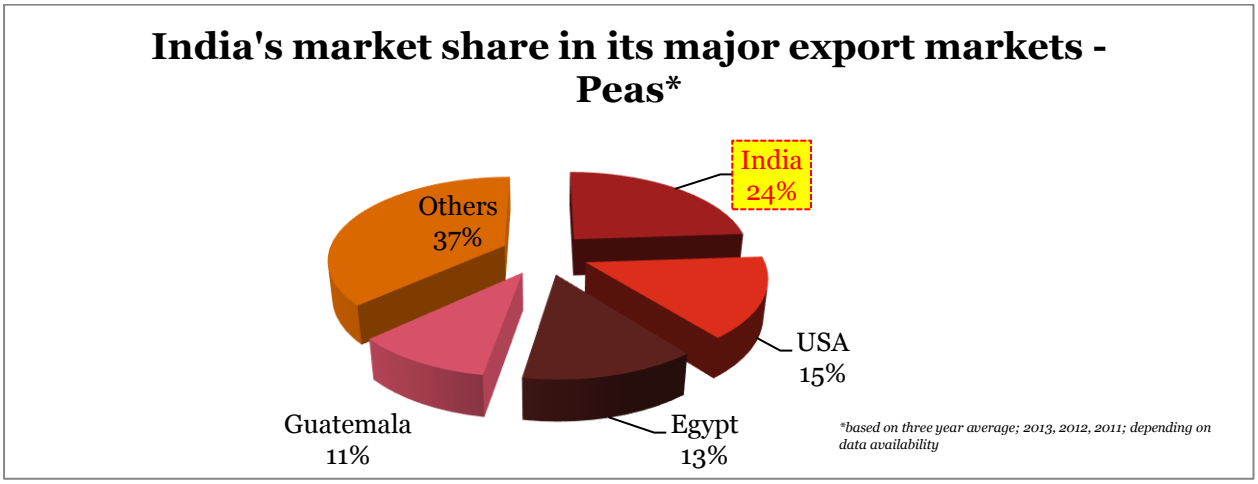


Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 32: Production and Export volume projections for India (5 yrs.)

3.2.4.1.1. Competition Scenario:

Nepal (32%), Saudi Arabia (17%), UAE (11%) and UK (11%) are the major export destinations for Indian Peas[10]. India enjoys a 24% market share in these markets. Figure below shows the competitive positioning of India in its major export markets.



Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 33 India's market share in its major export markets – Peas

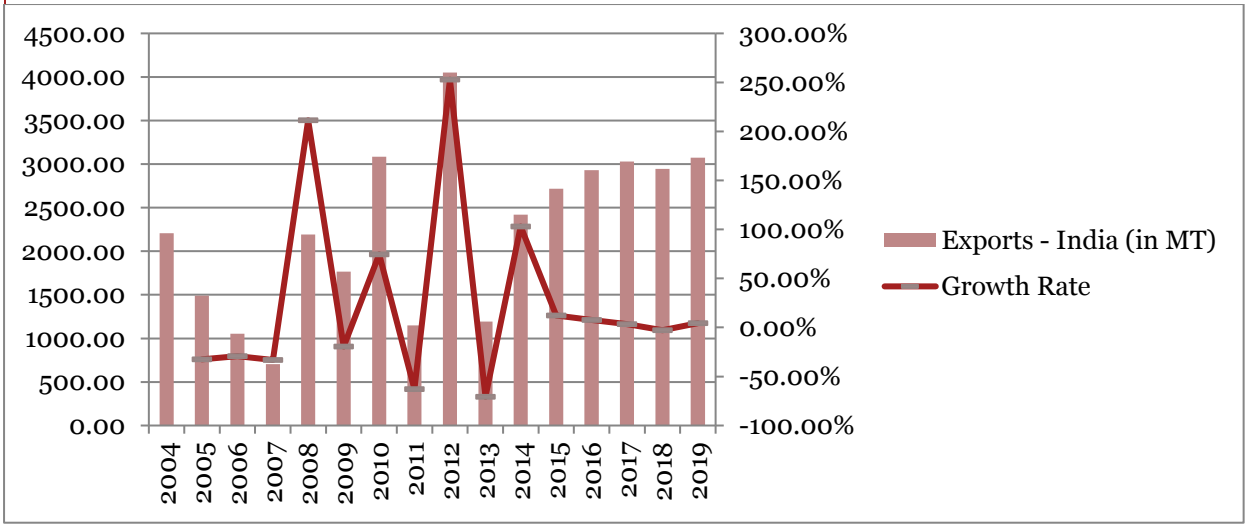
3.2.4.2. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 10 years and, using the least square method, project the same over next 5 years (though it has been fluctuating over the years), we see that Indian Peas exports are expected to grow at a cumulative CAGR of 4.63% to reach 3074 MT of annual exports in 2019.

Figure below depicts the export trend over the years and projections for next 5 years:

[10] *based on three year average; 2013, 2012, 2011; depending on data availability*
Source: UNComtrade, PwC Analysis



Source: UNComtrade, PwC Analysis

Figure 34 Export volume projections and growth rate for Peas from India based on linear forecasting (5 yrs.)

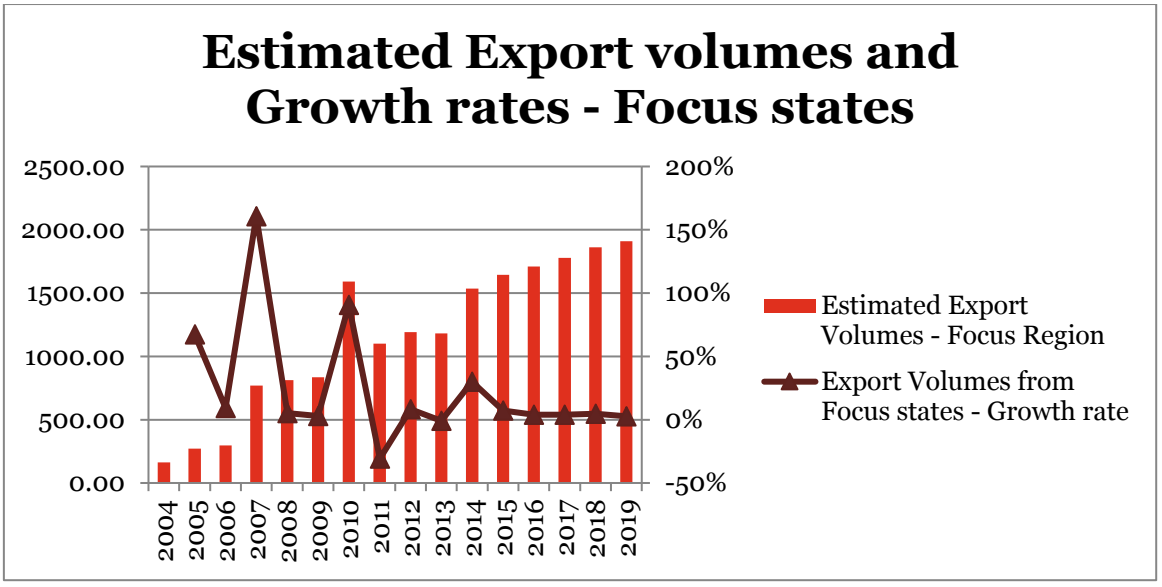
How much from Focus States –

Uttar Pradesh, Jharkhand, Punjab, West Bengal & Haryana are the major Peas producing areas in the country. The Focus States, Punjab, Haryana, Himachal Pradesh, together contribute to 22% of national production of Peas.

In order to estimate the contribution of Focus states in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 1910 MT by 2019 – a cumulative average growth rate of 41% is expected in these focus states of Punjab, Haryana & Himachal Pradesh.

Figure below depicts the estimated export volume projections for next 5 years with the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

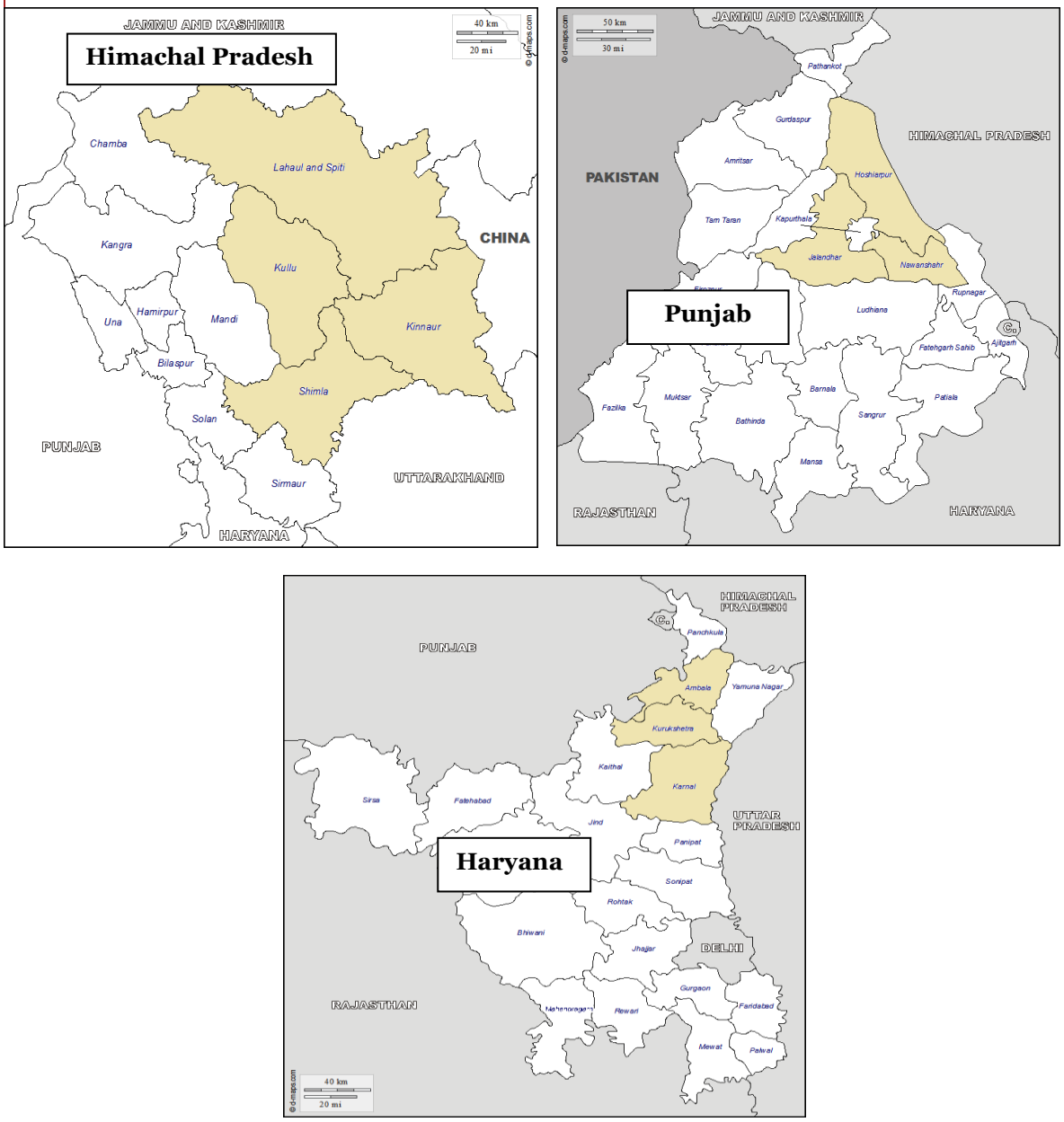
Figure 35 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 5 year period
2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

Based on these assumptions, it is projected that the export of Peas from the Focus States is about 1910 tons only.

The cluster to be covered consists of the following districts in the respective states:



It can be seen that the focus districts lay in the northern hill areas. The marketing season for peas in this region starts in April and lasts till January.

3.2.4.3. Crop Specific Recommendations to boost exports

In order to process exports, one pack house each at Kinnaur and Ludhiana is recommended. The required packhouses will be shared with other vegetables and fruits in the region and therefore, multi commodity pack house facility is recommended.

In addition to fresh peas' exports, there also exist substantial opportunity for value added products. Frozen peas are one such significant product category. Therefore, an IQF facility, to be shared with carrots, potatoes and tomatoes, is also recommended in the region.

3.2.5. Potato

The potato is the third most important food crop in the world after rice and wheat in terms of human consumption. More than a billion people worldwide eat potato, and global total crop production exceeds 300 million metric tons.

China is the biggest potato producer, and almost a third of all potatoes are harvested in China and India. Global trade in potatoes amounts to 3675 Mn USD, with 10.63 Mn tons of volumes traded on an annual basis (2013-14). Despite of a substantial production base, India holds a miniscule share of 2% in global trade of potatoes. Table 12 enlists the major potato exporters in the world with export quantity and their share in global trade.

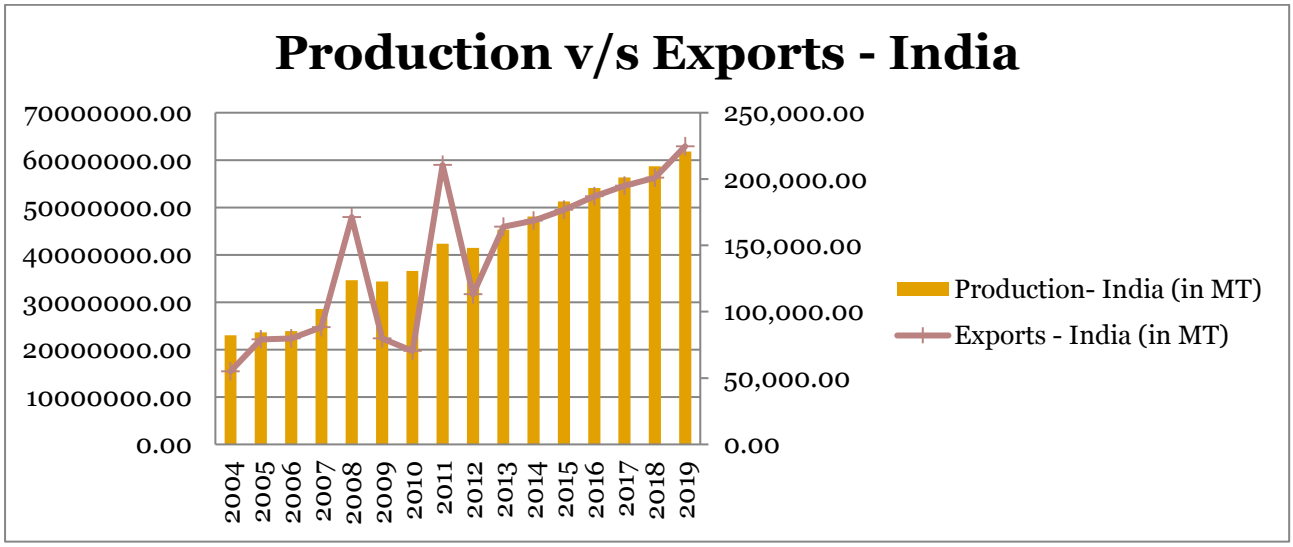
Table 12: Major Potato Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	Germany	2.10	20%
2	France	1.77	17%
3	Netherlands	1.11	10%
4	Belgium	0.91	9%
15	**India**	**0.16**	2%

Source: UNComtrade, PwC Analysis

3.2.5.1. Analysis of exports from India

On an average, India exports less than 1% (0.33%) of its total potato production on an annual basis. Production is expected to grow at a CAGR of 5.30% over next 5 years. Consequently, exports are expected to grow at a staggering CAGR of 20% to reach 224,669 MT by 2019. Figure below depicts the growth in production and exports over a 10 year period and projections for next 5 years.

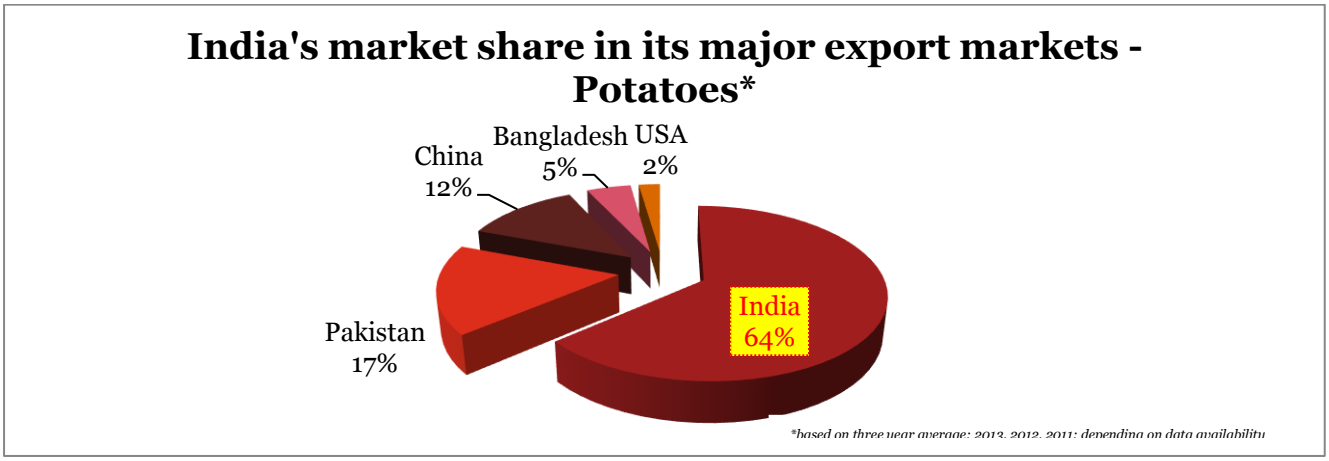


Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 36: Production and Export volume projections for India (5 yrs.)

3.2.5.1.1. Competition Scenario:

Nepal (68), Sri Lanka (4%), Maldives (4%) & Malaysia (2%) are the major export destinations for Indian Potatoes[11].They together attract almost 90% of India's export volumes. India enjoys a 64% market share in these markets. Figure below shows the competitive positioning of India in its major export markets.



Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 37 India's market share in its major export markets – Potatoes

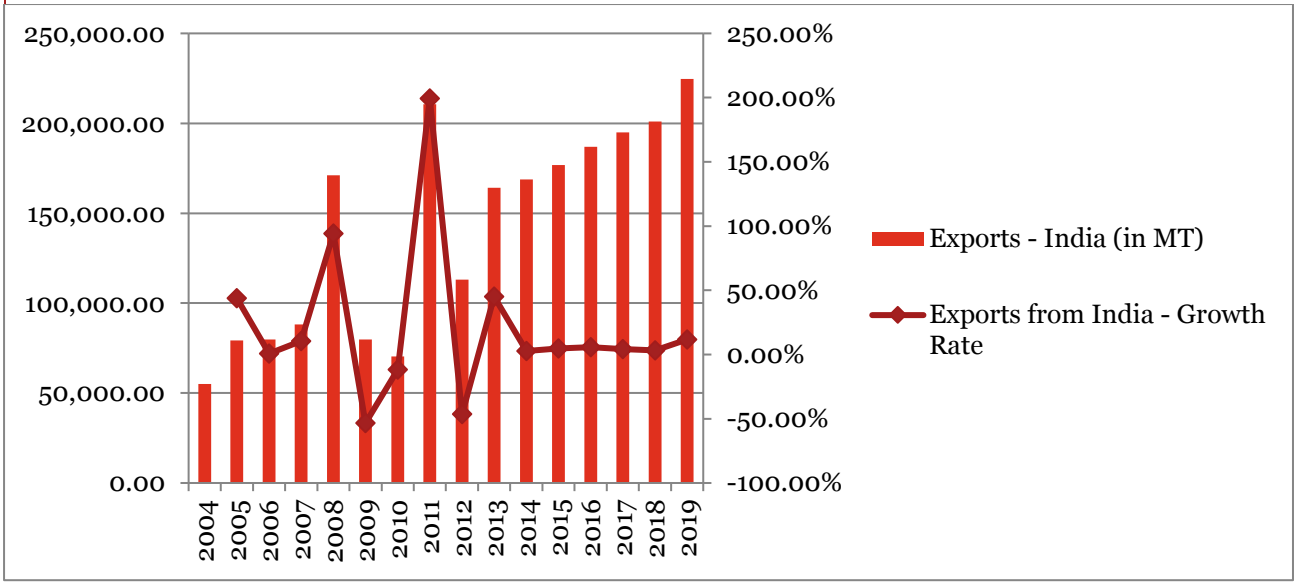
3.2.5.2. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 10 years and, using the least square method, project the same over next 5 years (though it has been fluctuating over the years), we see that Indian Potato exports are expected to grow at a cumulative CAGR of 19.79% to reach 224,669 MT of annual exports in 2019.

Figure below depicts the export trend over the years and projections for next 5 years:

[11] *based on three year average; 2013, 2012, 2011; depending on data availability*
Source: UNComtrade, PwC Analysis



Source: UNComtrade, PwC Analysis

Figure 38 Export volume projections and growth rate for Potatoes from India based on linear forecasting (5 yrs.)

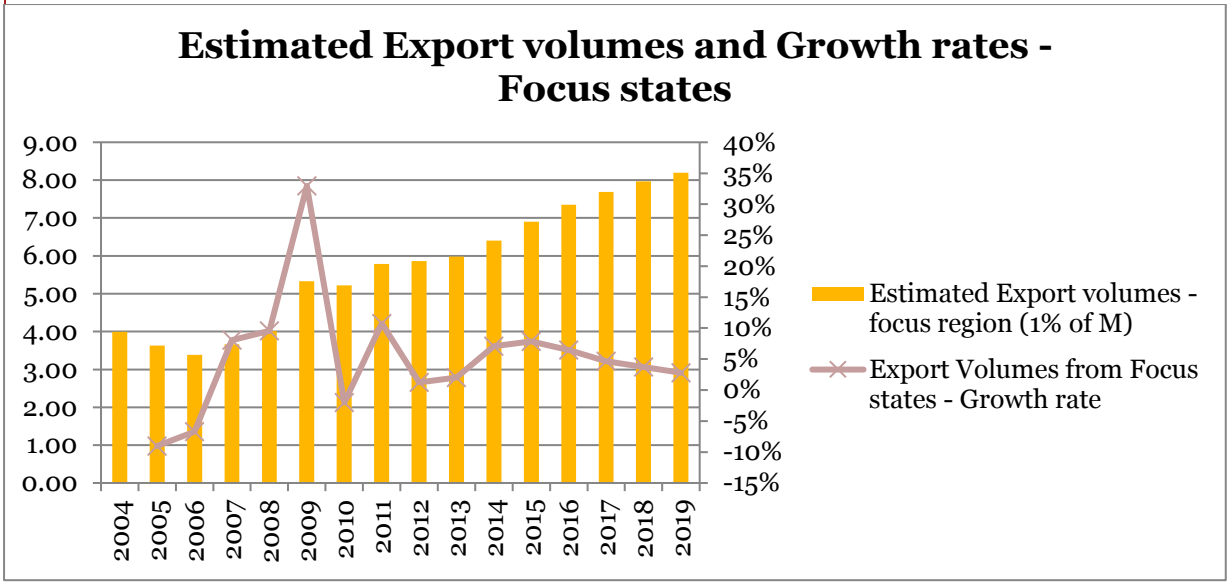
How much from Focus States –

Uttar Pradesh, Bihar, Gujrat, MP & Punjab are the major Potato producing areas in the country. The Focus States, Punjab, Haryana, Himachal Pradesh, together contribute to 8% of the national production of Potatoes.

In order to estimate the contribution of Focus states in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 8194 MT by 2019 – a cumulative average growth rate of 10% is expected in these focus states of Punjab, Haryana & Himachal Pradesh.

Figure below depicts the estimated export volume projections for next 5 years with the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

Figure 39 Estimated Export volumes and Growth rates - Focus states

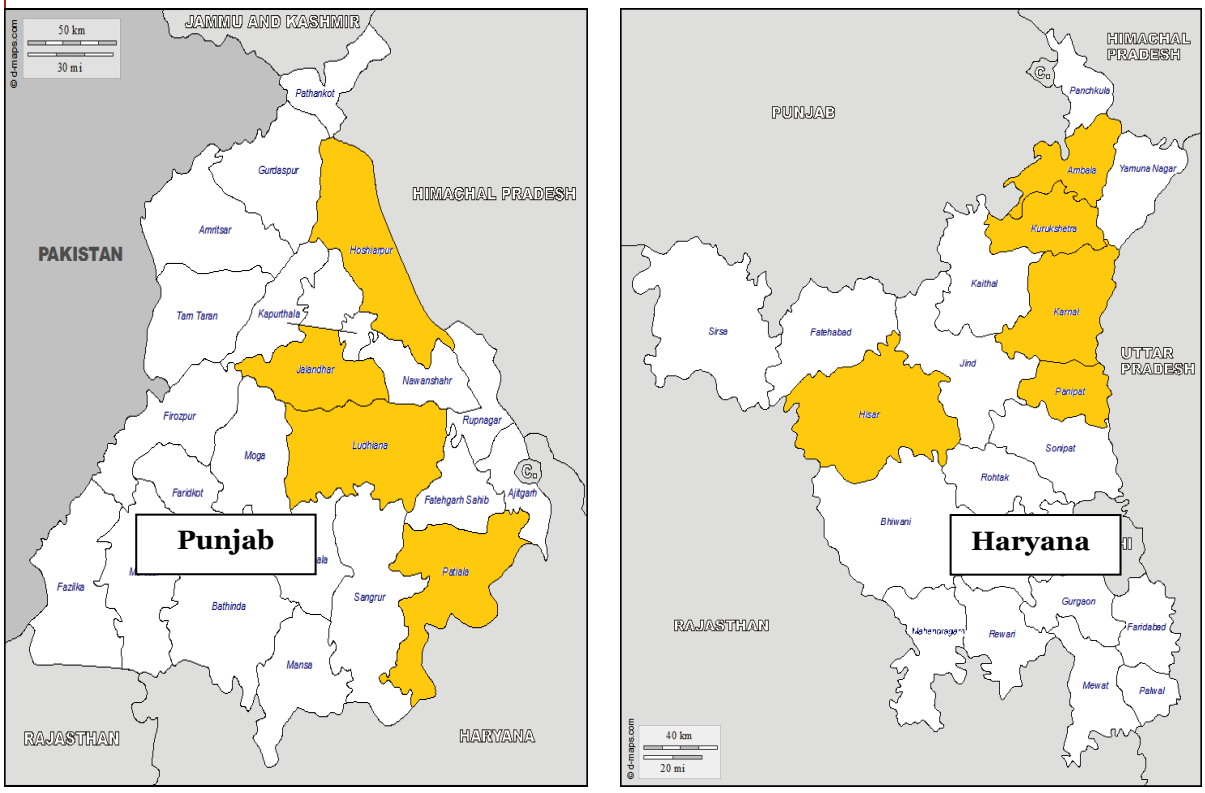
Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 5 year period

2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

Based on these assumptions, it is projected that the export of Potatoes from the Focus States is about 8194 tons only.

The cluster to be covered consists of the following districts in the respective states:



The marketing season for potatoes in this region starts in November and lasts till February.

3.2.5.3. Crop Specific Recommendations to boost exports

Considering the projected volumes for exports, a dedicated pack house (installed capacity/day: 60 MT) is recommended at Jalandhar in Punjab. Additional volumes can be directed to the pack house at Ludhiana. In case of Haryana, pack house for citrus fruits can be a shared facility for potatoes as well.

In addition to fresh potato' exports, there also exist numerous opportunities for value added products. However, considering product commonality and to bring economies of scale, we recommend an IQF line, which is to be shared with carrots, peas, tomatoes and other assorted vegetables – crops also available in the region. Private sector investment can also be lured for other processing infrastructure (such as an extrusion line, a spray drying unit, etc.) required for other value added products such as snacks, fries, potato powder & chips, etc.

3.2.6. Other Assorted Fruits/Vegetables

India is a major producer of varieties of fruits and vegetables. The country has been endowed with a wide range of climatic and physio-geographical conditions which are suitable for growing various kinds of vegetable cops. The country is the second largest producer of fruits and vegetables in the world. Fruits and vegetables together form 92 percent of the total horticulture production in the country.

The country has witnessed a tremendous increase in the overall vegetable production, especially during the green revolution. Increasing per capita income, health consciousness, urbanization, increasing working women, shifting of farmers to high value vegetables due to higher income, favourable income

elasticity of demand and annual growth rate for domestic demand for fruits & vegetables are also important ingredients for fuelling vegetable growth in the country.

In terms of production, major vegetables producing states in India are West Bengal, Uttar Pradesh, Bihar, Madhya Pradesh, Gujarat, Maharashtra, Odisha, Tamil Nadu, Andhra Pradesh, Karnataka and Haryana. These states constitute more than 80 percent of the total vegetable production in the country.

Amongst the Focus States, Haryana is ranked 11th in terms of the total vegetable production in the country. The major vegetable crops of Haryana are carrots, green chillies, cauliflower, radish, beans and cabbage. Punjab & Himachal Pradesh are also known for green chillies, capsicum & some gourds. The export of these vegetables is taking place majorly from Delhi airports or via land routes to some neighboring countries. These terminals generally export vegetables to countries like UAE, Saudi Arabia, Kuwait and other Middle East countries.

Though individually all these items do not have sufficient quantities, however at the aggregate level the volume becomes a substantial level of 5000 tons per annum (based on export data from DGCIS).

Market assessment for these products cannot be done because of the heterogeneous nature of the products groups, however at the aggregate level; the past volumes can be used to develop the volume potential for these crops.

These crops are –

1. Carrots
2. Green chillies
3. Cauliflower
4. Radish
5. Beans
6. Cabbage
7. Capsicum
8. Some gourds like bittergourd, snakegourd
9. Brinjal
10. Okra
11. Tomato
12. Pear
13. Guava
14. Litchi
15. Ber

3.2.6.1. Projection of Exports

Table 13: Export of assorted vegetables projected by least square method

Year	2012	2013	2014	2015	2016	2017
Volume in Tons	3408	3309	4816	5252	6403	7077
Growth Rate		-3%	46%	9%	22%	11%

Source: APEDA

These assorted crops are exported palletized at ICDs and are done so with the use of any cold chain. They crops are procured in the morning from markets. All major vegetable producing hubs in the Focus States are connected with Delhi airport via road. During the day the goods are sorted, palletized, certified and loaded on to the air crafts and by late evening or early morning the goods are at the destination. Each pallet will have an assortment of vegetables and fruits as per the order.

The growth volume is projected only for 3 years because the past records were also available for 3 years. Based on this project it appears that for these crops, Jalandhar in Punjab and Kinnaur in Himachal Pradesh would be most suitable location for setting up a pack house for these assorted commodities. Following map depicts the major production clusters in the Focus Region:

3.2.6.2. Crop Specific Recommendations to boost exports

The pack house can be shared with other vegetables in the region such as Peas and Potato. For value added products, the IQF facility for Peas can be utilized for these assorted vegetables also to achieve higher utilization for the facility.

So, two integrated pack houses - one each at Jalandhar in Punjab and Kinnaur in Himachal Pradesh are recommended for assorted vegetables and fruits to cater to an annual through put capacity of about 7000 tons by 2017.

3.2.7. Garlic

Allium sativum, commonly known as garlic, is a species in the onion genus, *Allium*. Garlic is native to central Asia, and has long been a staple in the Mediterranean region, as well as a frequent seasoning in Asia, Africa, and Europe. It is used for both culinary and medicinal purposes.

China is by far the largest producer of garlic, with around 20 million tonnes (40 billion pounds) grown annually, accounting for close to 80% of world output[12]. India (5%) and Republic of Korea (2%) follow, with Egypt (1%) on fourth place. Global trade in Garlic amounts to 2024 Mn USD, with 2 Mn tons of volumes traded on an annual basis (2013-14). Despite of strong production position, India holds a miniscule share of 1% in global trade of Garlic. Table 14 enlists the major garlic exporters in the world with export quantity and their share in global trade.

Table 14: Major Garlic Exporters in the world (2013-14)

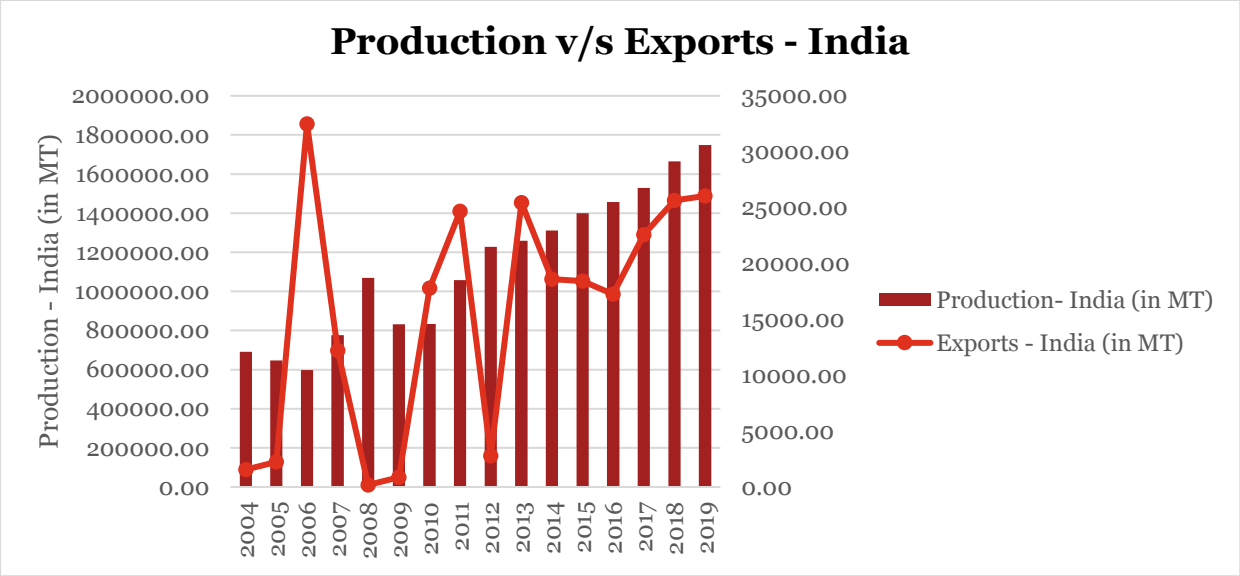
Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	China	1.63	81%
2	Spain	0.10	5%
3	Argentina	0.07	4%
4	Madagascar	0.05	2%
5	**India**	**0.03**	**1%**

Source: UNComtrade, PwC Analysis

3.2.7.1. Analysis of exports from India

On an average, India exports around 1% (1.43%) of its total garlic production on an annual basis. Production is expected to grow at a CAGR of 4.56% over next 5 years. Consequently, exports are expected to grow at a staggering CAGR of around 47% (46.40%) to reach 26,049.46 MT by 2019. Figure below depicts the growth in production and exports over a 10 year period and projections for next 5 years.

[12] UNComtrade Database, 2013-14

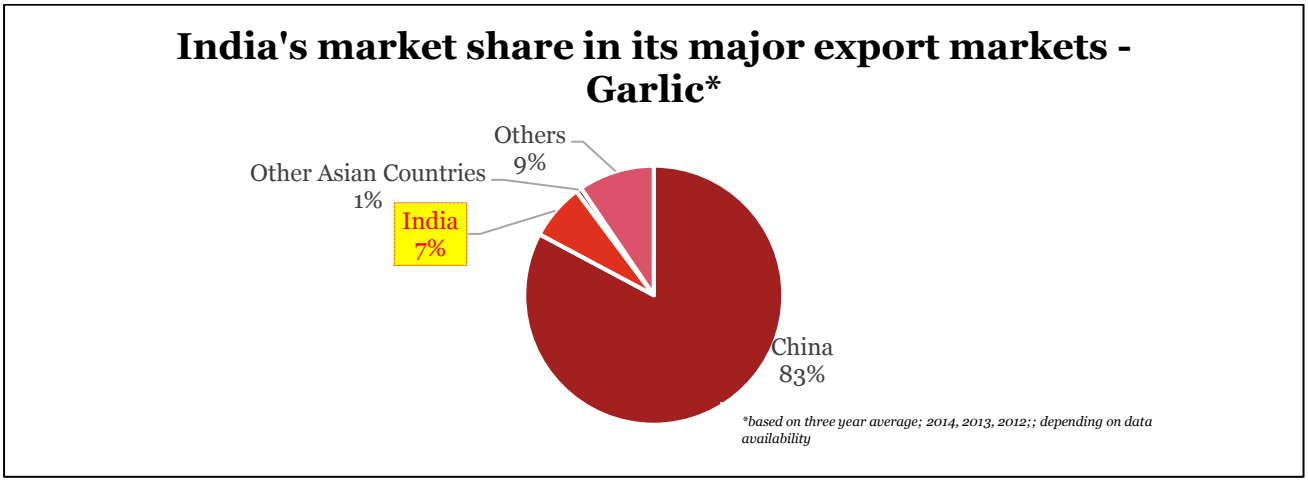


Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 40: Production and Export volume projections for India (5 yrs.)

3.2.7.1.1. Competition Scenario:

Thailand (38), Malaysia (17%), Bangladesh (15%), Pakistan (14%) and Indonesia (5%) are the major export destinations for Indian garlic[13].They together attract about 90% of India's export volumes. The export market in these top export destinations for India is also dominated by China, with a market share of 83%. India holds a marginal market share of 7% in these markets. Figure below shows the competitive positioning of India in its major export markets.



Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 41 India's market share in its major export markets – Garlic

[13] *based on three year average; 2014, 2013, 2012; depending on data availability*
Source: UNComtrade, PwC Analysis

3.2.7.2. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 10 years and, using the least square method, project the same over next 5 years (though it has been fluctuating over the years), we see that Indian Garlic exports are expected to grow at a staggering CAGR of 46.4% to reach 26,049 MT of annual exports in 2019.

Figure below depicts the export trend over the years and projections for next 5 years:

Source: UNComtrade, PwC Analysis

Figure 42 Export volume projections and growth rate for Garlic from India based on linear forecasting (5 yrs.)

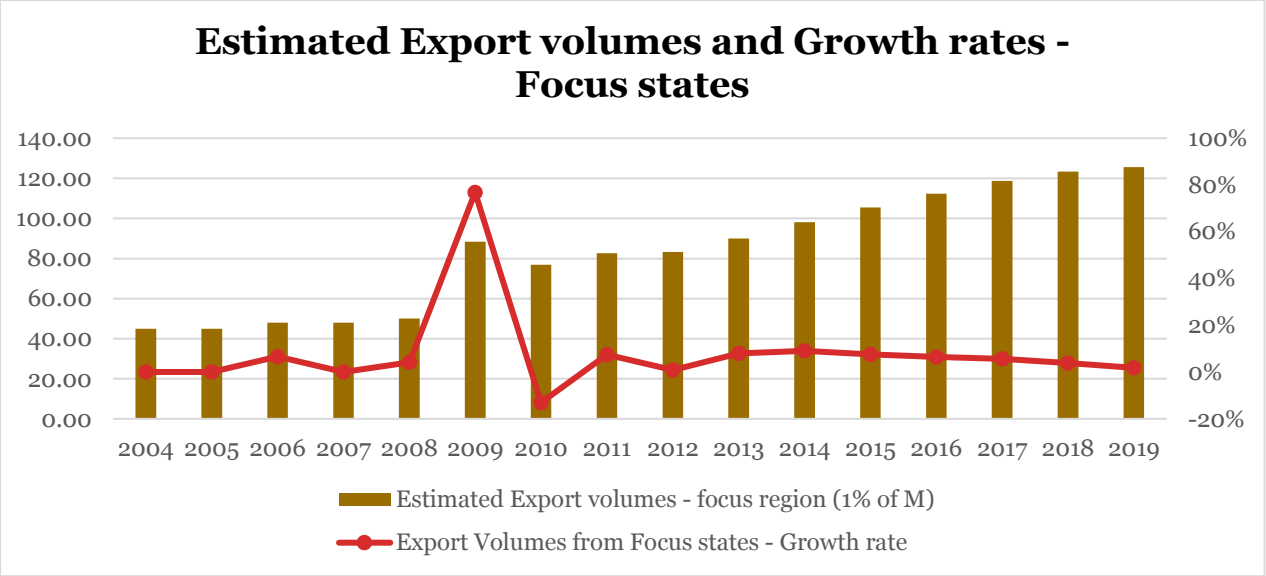
How much from Focus States –

Madhya Pradesh, Gujarat, Orissa, Rajasthan, Karnataka, Tamil Nadu, Maharashtra, Bihar and UP are the major Garlic producing areas in the country. Amongst the Focus States, Punjab has the highest Garlic production and contributes to almost 4% of the national production of Garlic.

In order to estimate the contribution of Focus states in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 126 MT by 2019 – a cumulative average growth rate of 15% is expected in the focus state of Punjab.

Figure below depicts the estimated export volume projections for next 5 years with the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

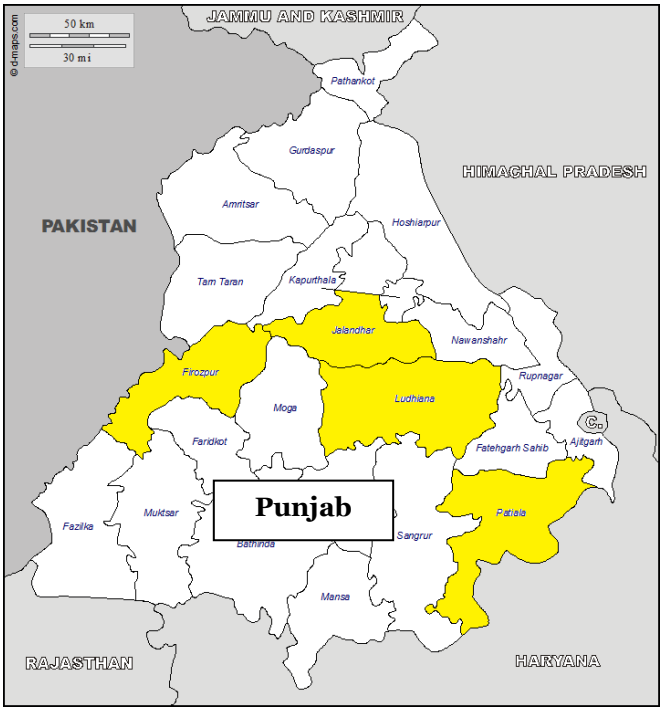
Figure 43 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 5 year period
2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

Based on these assumptions, it is projected that the export of Garlic from the Focus States is about 126 tons only.

The cluster to be covered consists of the following districts in the Focus State of Punjab:



Garlic is harvested from March to May and this can be used for domestic consumption year round.

3.2.7.3. Crop Specific Recommendations to boost exports

Considering the projected volumes for exports, no exclusive facility/primary processing infrastructure is required for Garlic. These additional volumes can be directed to the pack house for primary processing of assorted vegetables at Ludhiana.

In addition to fresh garlic exports, there also exist numerous opportunities for value added products. Garlic is being exported either in the form of dehydrated flakes or dehydrated powder. Dehydrated Garlic in powdered or granulated form is being used in place of fresh bulbs in many countries. The main advantages of preparation of value added products from Garlic are to increase the storage life and also to reduce the transportation cost and earn more foreign exchange. Also, the dehydrated products are more uniform in flavor than the stored bulbs. From India, large amounts of dehydrated products (flakes, Garlic oil, and dehydrated Garlic powder) are exported to Japan, UK, Italy, Turkey, Germany and France. Other Garlic products are peeled processed Garlic, crushed or chopped Garlic, Garlic granules and fried/roasted Garlic. Fried Garlic granules are also prepared from fresh Garlic bulbs and have good demand in foreign market. However, considering the low availability of surplus volumes, no additional infrastructure for processing is recommended at this stage in the Focus States. However, as production increases and exportable surplus available for processing reaches 500-1000 MT at least, establishment of a dehydration plant for garlic can be explored in future for value added products such as flakes and dehydrated Garlic powder.

3.2.8. Floriculture Products

During FY 2013-14, about 305,105 ha area was under flower production in different countries of the world. India has the maximum area under ornamental crops (88,600 ha) followed by China (59,527 ha), Indonesia (34,000 ha), Japan (21,218 ha), USA (16400 ha), Brazil (10285 ha), Taiwan (9.661 ha), The Netherlands (8,017 ha), Italy (7.654 ha), the united Kingdom (6,804 ha), Germany (6,621 ha) and

Colombia (4,757 ha)[14].Globally more than 145 countries are involved in the cultivation of ornamental crops and the area under these crops is increasing steadily. The production of flower crops has increased significantly and there is a huge demand for floricultural products in the world, resulting in growing International Flower Trade. The world consumption of cut flowers and plants is increasing and there is a steady annual increase of 10 to 15 per cent in all importing countries. Due to globalization and its effect on income, there is growing per capita floriculture consumption in most of the countries.

Cut flowers, which are traded worldwide, have always been the main group within global floriculture trade, followed by living plants, which are traded more regionally. As geographic expansion of cut flower production as well as further developments in logistics make long haul transportation more viable, the share of cut flowers in floriculture trade is likely to grow (Rabo Bank Report; 2015).

The total global trade in flowers amounts to 1542.37 Mn USD with export volumes of around 0.54 MMT/annum. India holds a meagre share of less than 1% in the global floral trade. Netherlands (50%), Columbia (14%), Malaysia (8%) and Denmark (3%) are the top exporters of flowers in the world (2013-14).

Table below gives details on top exporters (based on export volumes), export quantity and their share in global trade.

Table 15: Major Cut Flower Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	Netherlands	0.27	50%
2	Colombia	0.08	14%
3	Malaysia	0.04	8%
4	Denmark	0.02	3%
30	**India**	**0.002**	**0.30%**

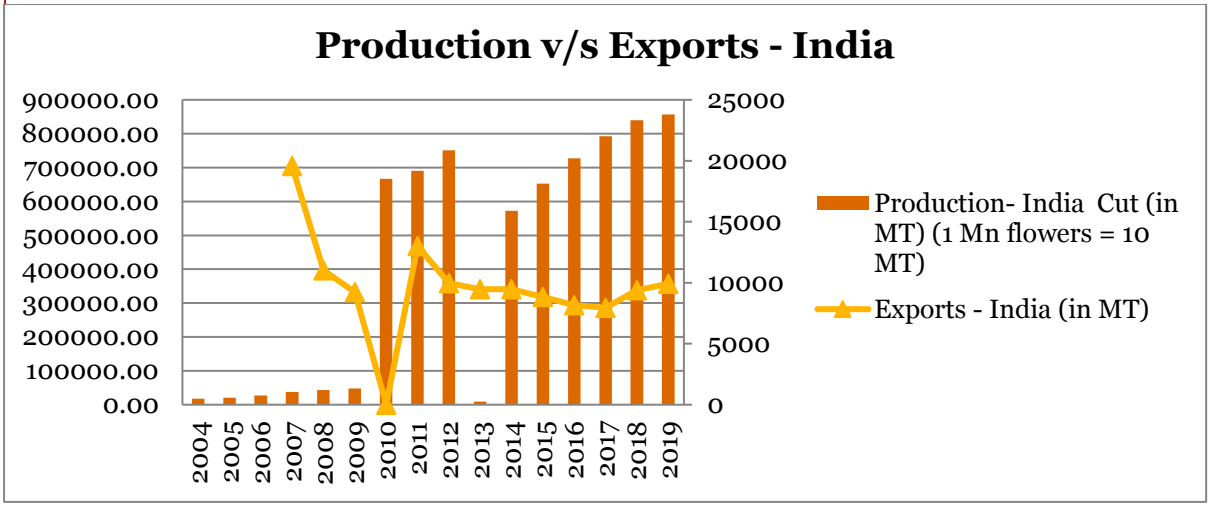
Source: UNComtrade, PwC Analysis

3.2.8.1. Analysis of Floriculture exports from India

Indian floriculture industry comprises of flowers such as Rose, Tuberose, Gladiolus, Anthurium, Carnations, Marigold etc. Cultivation is undertaken in open farm conditions as well as state-of-the-art poly and greenhouses. There are more than 300 export-oriented units in India. More than 50% of the floriculture units are based in Karnataka, Andhra Pradesh and Tamil Nadu. With the technical collaborations from foreign companies, the Indian floriculture industry is poised to increase its share in world trade.

Currently, on an average, India exports almost 16% of its cut flower production annually. Production is expected to grow at a CAGR of 8.40% over next 5 years. Consequently, exports are expected to grow at a CAGR of 0.93% to reach 9916.33 MT by 2019. Figure below depicts the growth in production and exports over a 10 year period and projections for next 5 years.

[14] International Journal of Business and Management Invention ISSN (Online): 2319 – 8028, ISSN (Print): 2319 – 801X www.ijbmi.org Volume 2 Issue 5 ǁ May. 2013ǁ PP.15-25

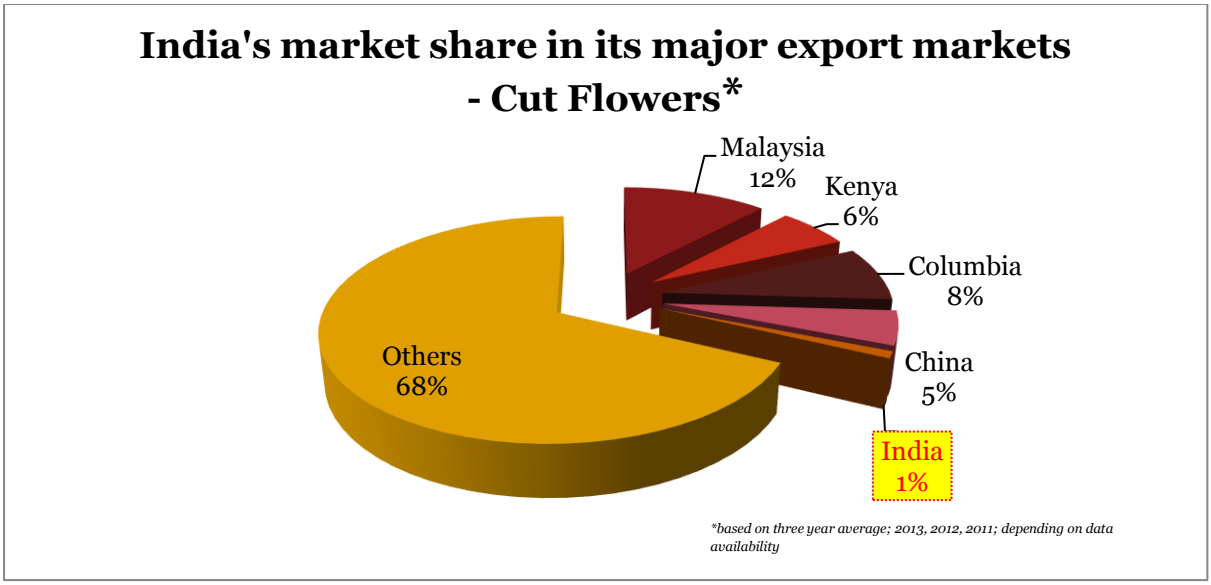


Source: UNComtrade, FAOSTAT, Indiastat.com, PwC Analysis

Figure 44: Production and Export volume projections for India (5 yrs.)

3.2.8.1.1. Competition Scenario

UAE (84%), Qatar (8%), New Zealand (2%) and Saudi Arabia (3%) are the major export destinations for Indian Floriculture exports[15]. India enjoys a 1% market share in these markets. Figure below shows the competitive positioning of India in its major export markets.



In the international market, Netherlands control over 50% of the flower trade, followed by Latin America and African countries.

Based on above analysis, it can be inferred that there exists potential for India to strengthen its position in global floriculture exports, with specific focus on Cut Flower exports.

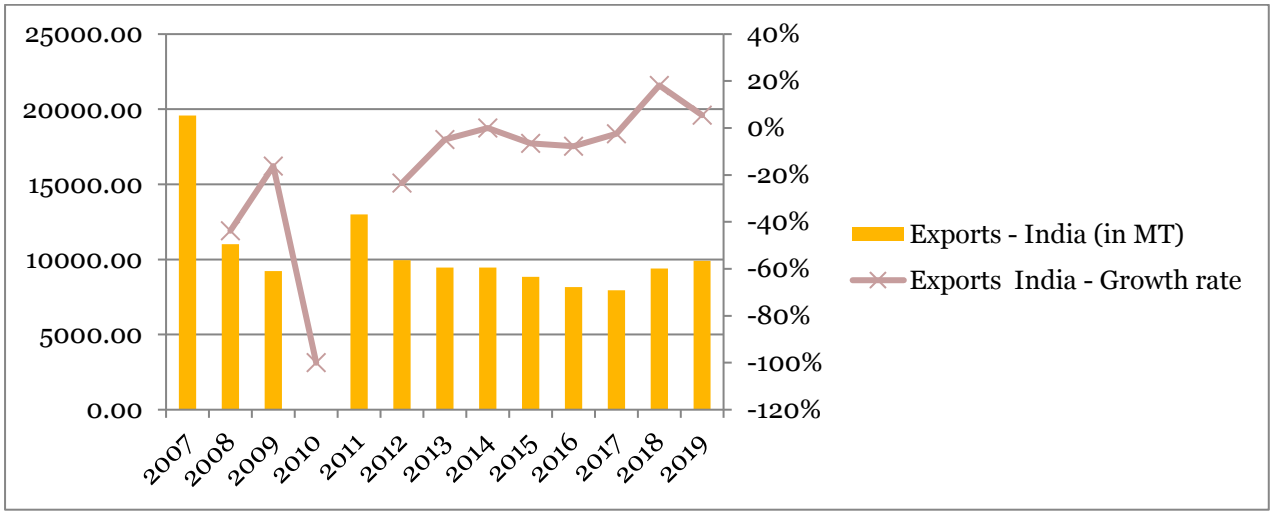
[15] *based on three year average; 2013, 2012, 2011; depending on data availability*
Source: UNComtrade, PwC Analysis

3.2.8.2. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 10 years and, using the least square method, project the same over next 5 years (though it has been fluctuating over the years), we see that Indian Cut Flower exports are expected to grow at a cumulative CAGR of 0.93% to reach 9916.33 MT of annual exports in 2019.

Figure below depicts the export trend over the years and projections for next 5 years:



Source: UNComtrade, PwC Analysis

Figure 45 Export volume projections and growth rate for Cut Flower Exports from India based on linear forecasting (5 yrs.)

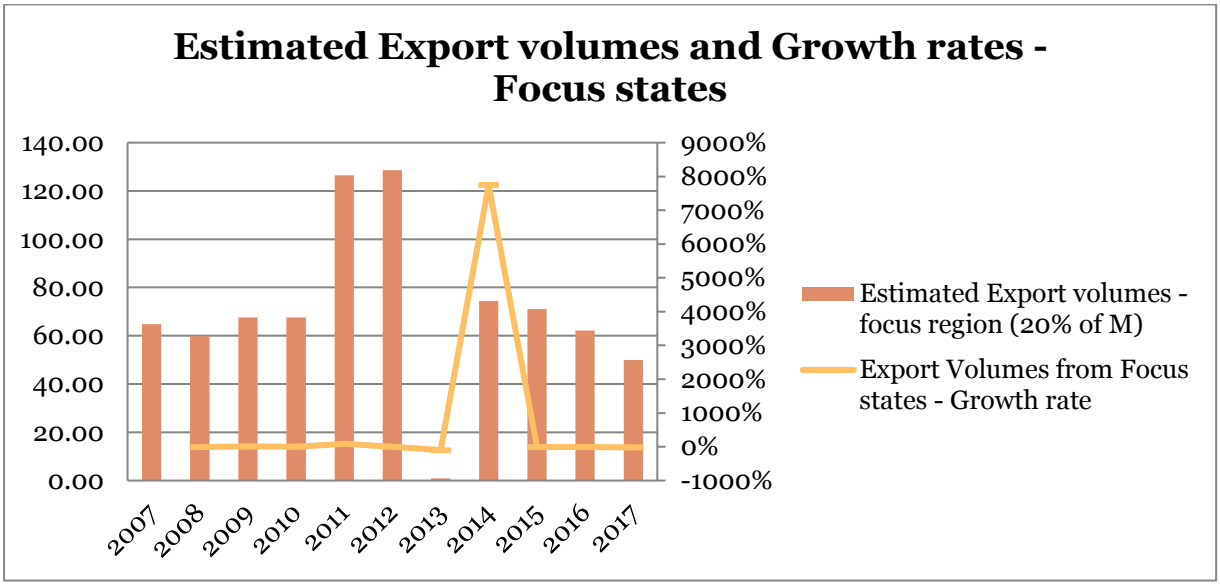
How much from Focus States –

Maharashtra, Karnataka, Andhra Pradesh, Haryana, Tamil Nadu , Rajasthan , West Bengal have emerged as major floriculture centers in the country. Himachal Pradesh stands first in the production of Chrysanthemum and Carnations at the national level and contributes to almost 46% and 66% respectively to the cut flower production. Haryana ranks third in Chrysanthemum (cut flowers) production at the national level. Gladiolus and Tube Rose are other prominent floriculture products from the Focus Region.

In order to estimate the contribution of Focus states in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 50 MT by 2019 – a cumulative average growth rate of 169% is expected in these focus states of Punjab, Haryana & Himachal Pradesh.

Figure below depicts the estimated export volume projections for next 5 years with the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

Figure 46 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 5 year period

2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

Based on these assumptions, it is projected that the export of Cut Flowers from the Focus States is about 50 tons (rounded off) only.

Palampur can be considered as a key central location for this purpose.

3.2.8.3. Crop Specific Recommendations to boost exports

In order to process exports of cut flowers, a specialized integrated pack house with pre-cooling facilities and an automatic grading sorting line is recommended. The packhouses will have a pre-cooling chamber and an automated flower grading and sorting line to ensure quality and better remuneration to flower growers.

3.2.9. Cereals

The Focus Region is a major production hub for cereals viz. Rice, wheat, barley and Bajra. Punjab ranks no. 1 in terms of national production of Total Food grains in the country. Punjab's contribution alone to the national production of rice is around 11%. Punjab and Haryana together, on an average, contribute to around 15% of the national production of wheat on an annual basis. Barley and Bajra are other

important cereals produced in the region – Haryana is ranked no. 3 in the production of Barley and Bajra in the country, Punjab is ranked no. 5 in barley production in India in FY 2013-14.

Since rice, wheat and pulses fall under the purview of Essential Commodities Act, 1955; 2011, their exportable surplus will vary based on domestic procurement requirements/government quotas. Also, most of these commodities have long shelf life and therefore, requirement for post-harvest infrastructure is very minimal.

Therefore, considering the above factors, export potential is estimated for only coarse cereals viz. Barley and Bajra. These commodities find applications both as human food and animal feed. The demand for these commodities is also on an increasing trend, owing to increasing use of these commodities in novel diet foods such as multigrain biscuits/cereals, high fiber – low fat food products, etc. In addition to these, other value addition opportunities can also be explored for malt based foods and beverages.

Following sections cover the export potential analysis for Barley and Bajra from India and from the Focus States:

3.2.9.1. Barley

Barley (Hordeum vulgare L.) (Hindi name: Jau), a cereal grain derived from an annual grass is the fourth most important cereal crop in the world after rice, wheat and maize.

The annual global barley production has been in the range of 130-140 million tons in the recent years. However, in 2008-09 it has risen sharply to 158 million tons. The total average production of all coarse cereals in the recent years has been around 1000 million tons.

European Union, Russia, Ukraine, Canada, Australia, Turkey and USA are the major producers of barley accounting for around 75% of the total global production, with average production in these regions being around 55, 18, 10, 10, 6, 6, 4-5 million tons respectively in the recent years.

Following corn, barley is the second largest coarse cereal traded globally. The total global trade in Barley amounts to 8607 Mn USD with export volumes of around 31 Mn MT/annum. India holds a meagre share of 1% in the global trade of Barley. France (21%), Australia (17%), Argentina (11%) and Germany (9%) are the top exporters of Barley in the world (2013-14).

Table below gives details on top exporters (based on export volumes), export quantity and their share in global trade.

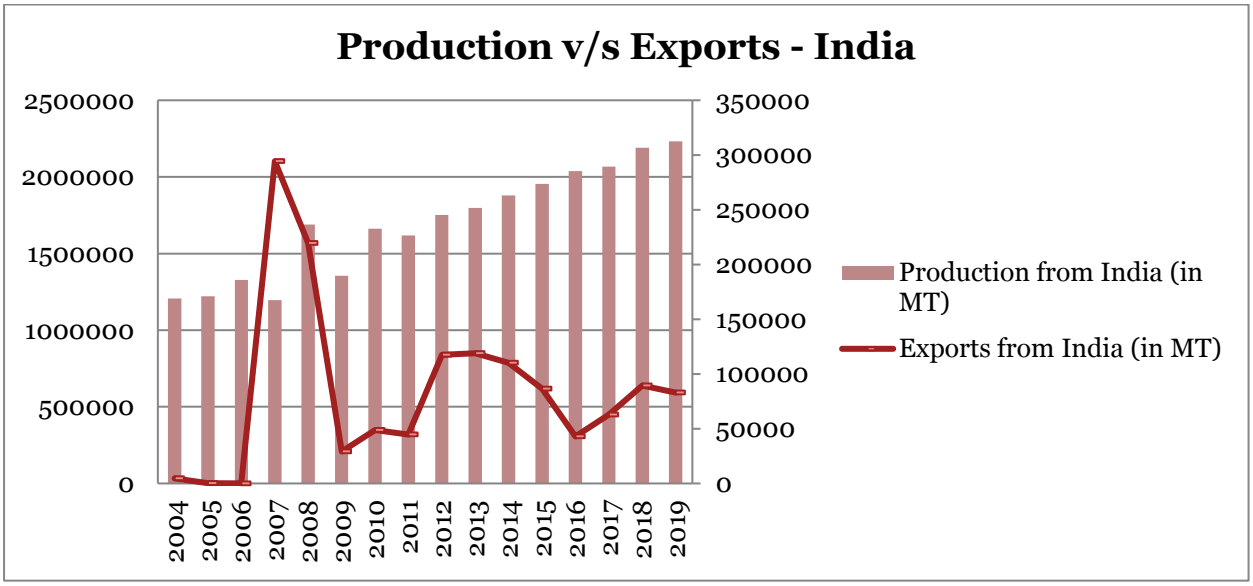
Table 16: Major Barley Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
x1	France	6.47	21%
2	Australia	5.12	17%
3	Argentina	3.36	11%
4	Germany	2.85	9%
13	**India**	**0.39**	**1.27%**

Source: UNComtrade, PwC Analysis

3.2.9.1.1. Analysis of Barley exports from India

On an average, India exports almost 6% of its total production of Barley on an annual basis. Production is expected to grow at a CAGR of 2.06% over next 5 years. Consequently, exports are expected to grow at a CAGR of 4% to reach 2 Mn MT by 2019. Figure below depicts the growth in production and exports over a 10 year period and projections for next 5 years.



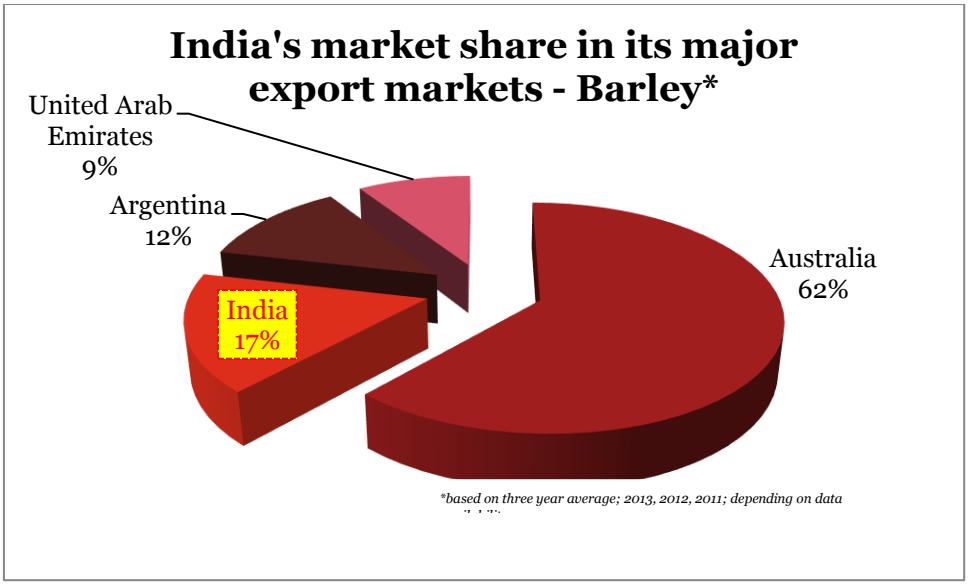
Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

Figure 47: Production and Export volume projections for India (5 yrs.)

Competition Scenario:

Iran (27%), Oman (21%), UAE (14%) and Republic of Korea (6%) are the major export destinations for Indian Barley[16]. India holds second position in these markets, in terms of volumes traded on an annual basis, with a 17% market share. Figure below shows the competitive positioning of India in its major export markets.

[16] *based on three year average; 2013, 2012, 2011; depending on data availability*
Source: UNComtrade, PwC Analysis



Source: UNComtrade, FAOSTAT, NHB Statistics, PwC Analysis

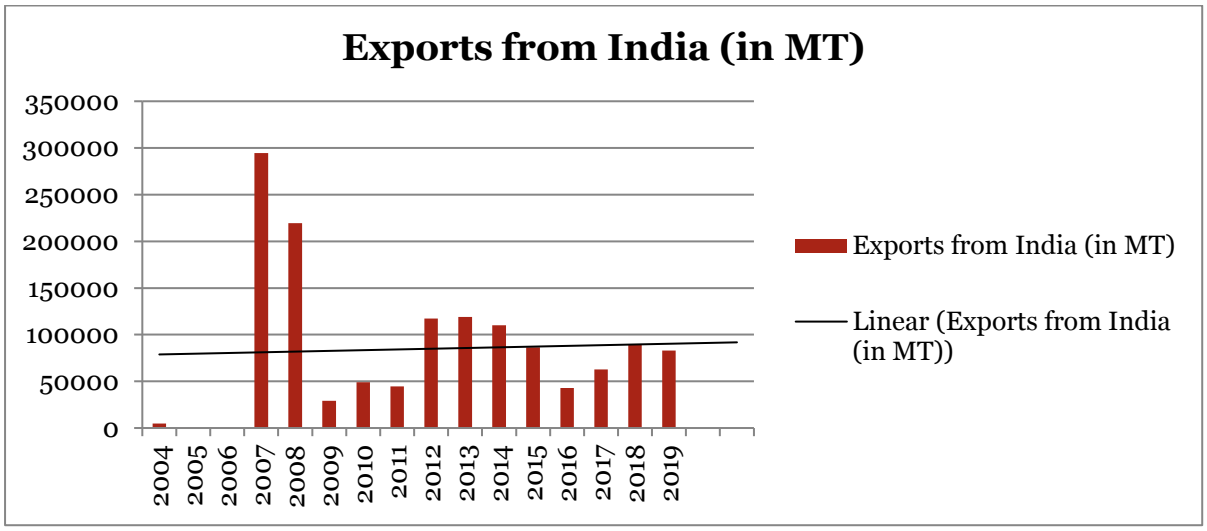
Figure 48 India's market share in its major export markets – Barley

3.2.9.1.2. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 10 years and, using the least square method, project the same over next 5 years (though it has been fluctuating over the years), we see that Indian Barley exports are expected to grow at a staggering CAGR of 21.10% to reach 83088 MT of annual exports in 2019.

Figure below depicts the export trend over the years and projections for next 5 years:



Source: UNComtrade, PwC Analysis

Figure 49 Export volume projections for Barley from India based on linear forecasting (5 yrs.)

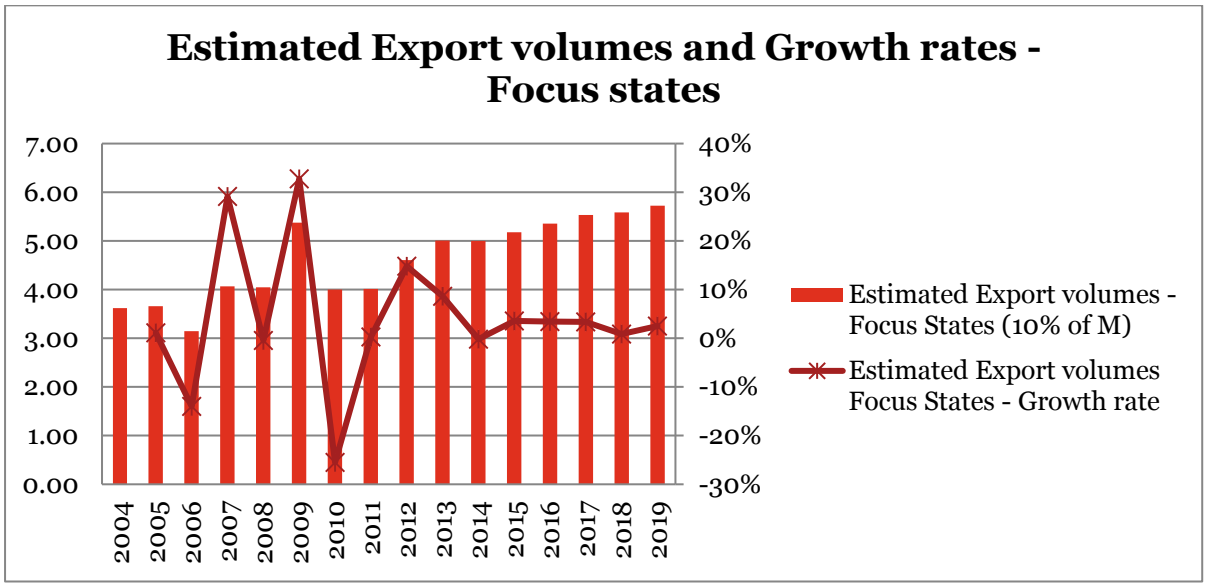
How much from Focus States –

The major producers of Barley in the country are Rajasthan (40%), Uttar Pradesh (34%), Madhya Pradesh (8%), Haryana (6%) and Punjab (5%). Some cultivation is also undertaken in Bihar, Himachal Pradesh, and Uttaranchal.

In order to estimate the contribution of Focus states (Punjab and Haryana) in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 5722 MT by 2019 – a cumulative average growth rate of 5% is expected in the focus states.

Figure 47 depicts the estimated export volume projections for next 5 years with the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

Figure 50 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 5 year period

2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

Based on these assumptions, it is projected that the export of Barley from the Focus States is about 5722 tons only.

Barley is cultivated as a rabi crop in India, with sowing being undertaken from October to December and harvesting from March to May.

3.2.9.1.3. Crop Specific Recommendations to boost exports

Food Grade Barley is exported as a Bulk commodity and hence, do not require any additional export related infrastructure.

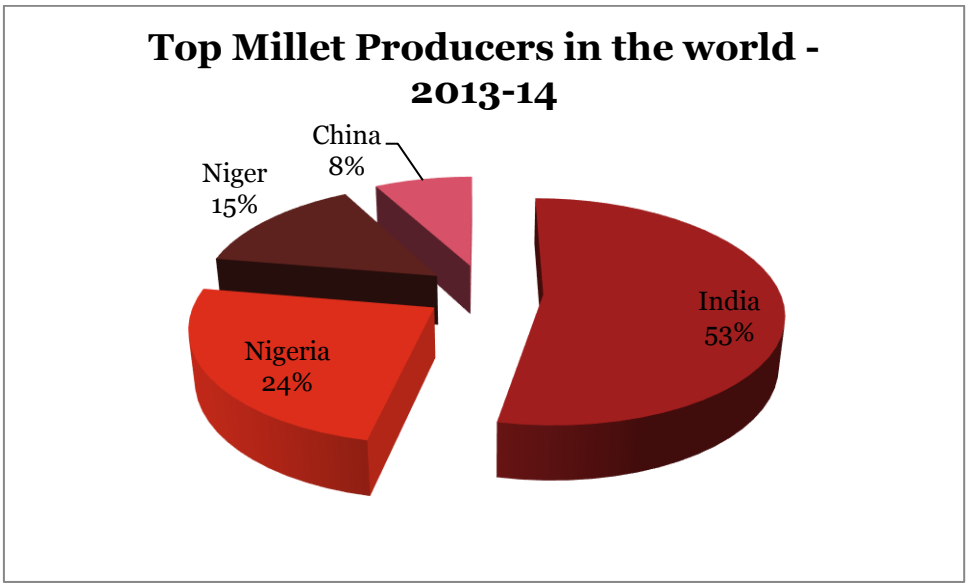
In addition to direct human consumption barley is utilized by the beer industry, food processing industry and feed manufacturing industry in India. While, demand from feed sector is more or less constant, demand from beer and food processing sectors are picking up. Rising demand for beer is leading to increased demand for barley malt from Indian beer manufacturing units. The country's beer consumption in volume terms is projected to grow by almost 51% percent in recent years. Owing to this rising demand for Indian Malt in both domestic and export markets and considering that 85% of Malt demand in India is currently supported by imports, a malting unit could be installed to cater to these surplus export volumes in near future.

3.2.9.2. Pearl Millet/Bajra

Millets are a group of highly variable small-seeded grasses, widely grown around the world as cereal crops or grains for fodder and human food. These are important crops in the semi-arid tropics of Asia and Africa (especially in India, Nigeria, and Niger), with 97 percent of millet production in developing countries. The crop is favored due to its productivity and short growing season under dry, high-temperature conditions.

The most widely grown millet is pearl millet, which is an important crop in India and parts of Africa. Finger millet, proso millet, and foxtail millet are also important crop species.

India is the top producer of millets in the world. Others include Nigeria, Niger & China. They together contribute to nearly 70% to the annual production of Millets globally.



Source: FAO: Economic And Social Department; The Statistical Division

Figure 51: Top Millet producers in the world – FY 2013-14

Study on identification of export oriented integrated infrastructure for agri products from Punjab, Haryana & Himachal Pradesh - Agricultural and Processed Food Products Export Development Authority (APEDA)

The total global trade in Millet amounts to 74.42 Mn USD with export volumes of around 0.16 MMT/annum. India holds 18% share of the total global trade of Millets, second only to Russia with 24% market share in terms of volume.

Table below gives details on top exporters (based on export volumes), export quantity and their share in global trade.

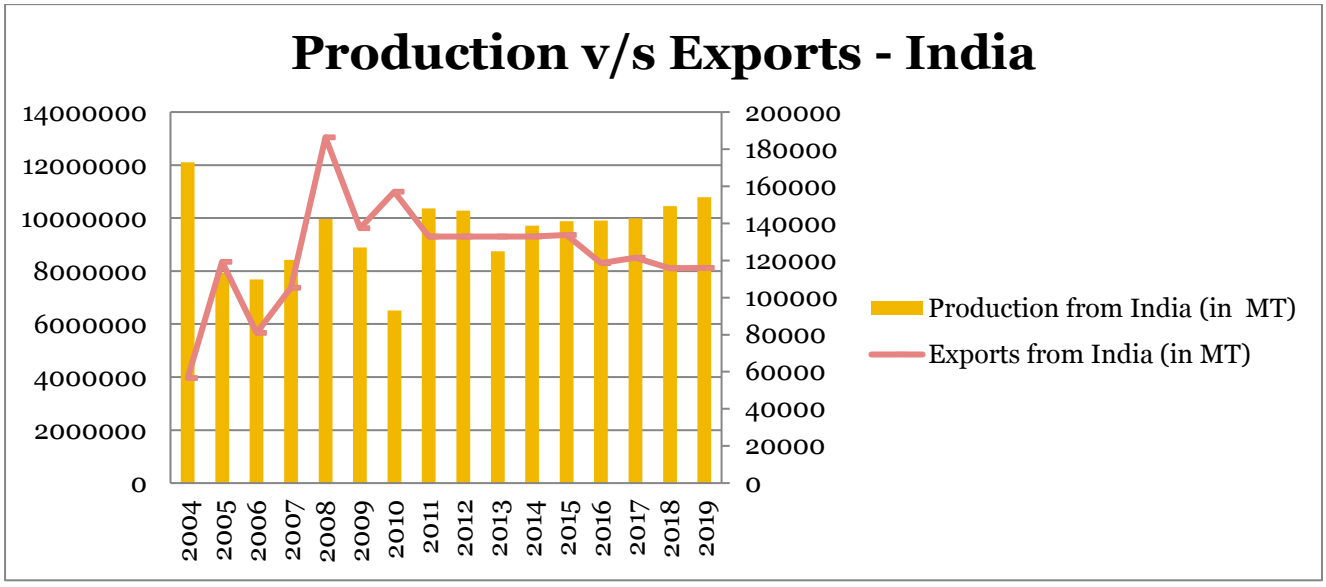
Table 17: Major Millet Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	Russian Federation	0.039	24%
2	**India**	**0.030**	**18%**
3	France	0.020	12%
4	USA	0.015	9%

Source: UNComtrade, PwC Analysis

3.2.9.2.1. Analysis of Millets' exports from India

On an average, India exports less than 2% (1.35%) of its total production of Millets on an annual basis. Production is expected to grow at a CAGR of 3.57% over next 5 years. Consequently, exports are expected to grow at a CAGR of 5% to reach 115969 MT by 2019. Figure 49 depicts the growth in production and exports over a 10 year period and projections for next 5 years.

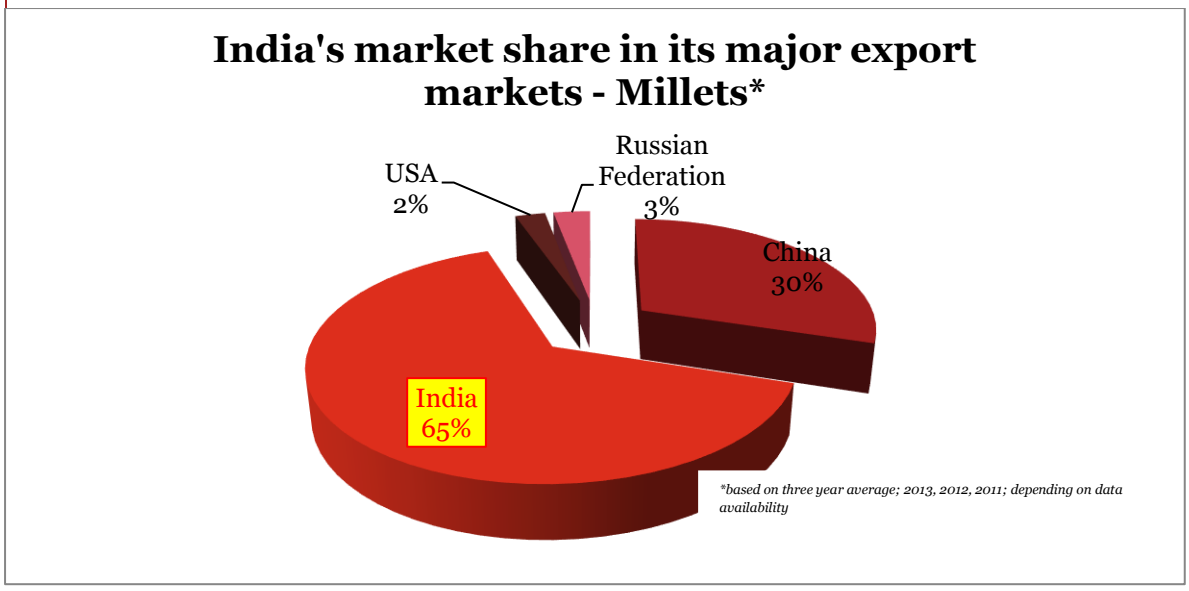


Source: UNComtrade, FAOSTAT, Indiastat.com, PwC Analysis

Figure 52: Production and Export volume projections for India (5 yrs.)

3.2.9.2.2. Competition Scenario

In FY 2013-14, UAE (19%), Vietnam (13%), Japan (8%) and Nepal (7%) are the major export destinations for Indian Millets. India enjoys a 50% market share in these markets. Figure 50 shows the competitive positioning of India in its major export markets.



Source: UNComtrade, FAOSTAT, Indiastat.com, PwC Analysis

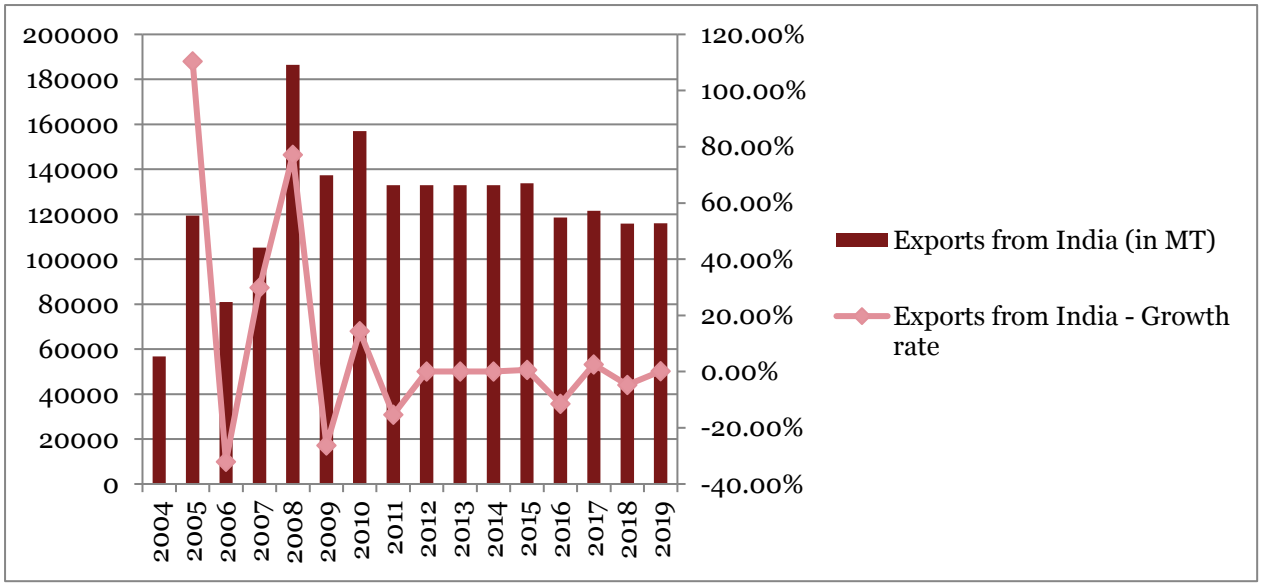
Figure 53 India's market share in its major export markets – Millets

3.2.9.2.3. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 10 years and, using the least square method, project the same over next 5 years, we see that Indian Millets' exports are expected to grow at a cumulative CAGR of 4.89% to reach 115969 MT of annual exports by 2019.

Figure 51 depicts the export trend over the years and projections for next 5 years:



Source: UNComtrade, PwC Analysis

Figure 54 Export volume projections and growth rate for Peas from India based on linear forecasting (5 yrs.)

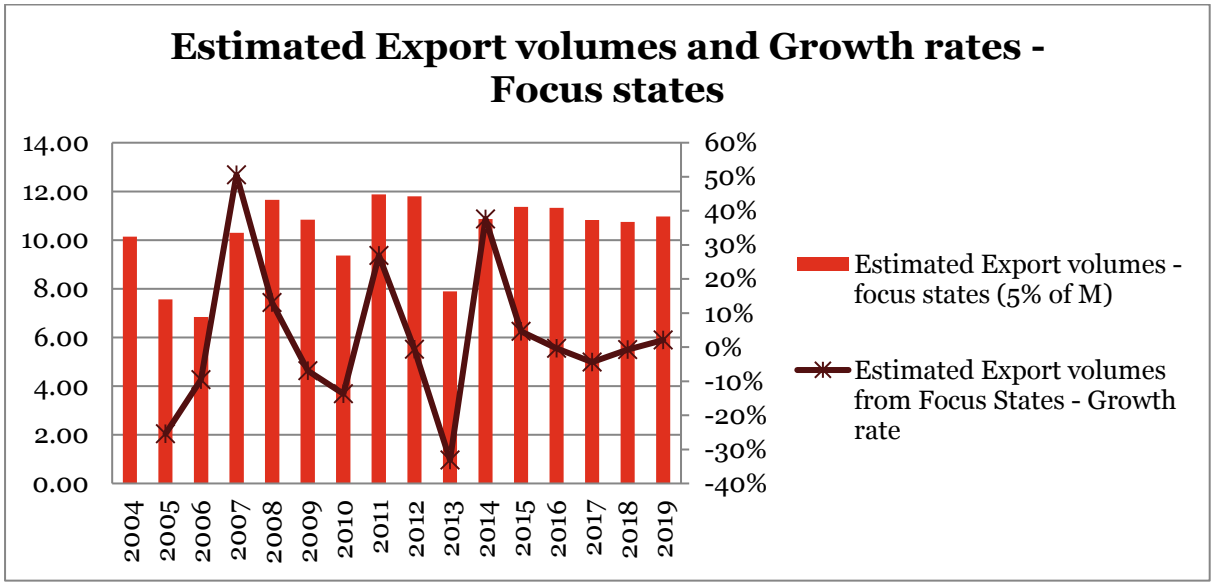
How much from Focus States –

Rajasthan, Uttar Pradesh, Maharashtra, Gujrat & Haryana are the major Millet producing areas in the country. The Focus States, Punjab, Haryana, Himachal Pradesh, together contribute to almost 10% of total national production of millets. 90% of Millet production in Focus States comprises of Pearl Millet.

In order to estimate the contribution of Focus states in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 10963.25 MT by 2019 – a cumulative average growth rate of 6% is expected in these focus states of Punjab & Haryana.

Figure 52 depicts the estimated export volume projections for next 5 years with the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

Figure 55 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 5 year period
2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

Based on these assumptions, it is projected that the export of Millets (predominantly Pearl Millets) from the Focus States is about 10963 (rounded off) tons only.

3.2.9.2.4. Crop Specific Recommendations to boost exports

Pearl millet cultivation is dispersed mainly during Kharif (Rainy) season across the country. Summer pearl millet is popular in Gujarat State. It is also grown during summer season in Punjab, Rajasthan and Northern India.

For summer pearl millet, the entire grain produced is marketed immediately after harvest. Its grain is consumed domestically for food particularly in the lean season in areas where summer pearl millet is not grown and the second and third grade grain is extensively used by the poultry and alcohol industries. It is a preferred grain for export to the Gulf countries for poultry feed and other uses. Thus, the summer crop is mainly cultivated as a commercial crop.

Owing to this rising demand for Indian Malt and Animal Feed industries in both domestic and export markets and considering that 85% of Malt demand in India is currently supported by imports, a malting unit could be installed to cater to these surplus export volumes in near future.

3.2.10. Animal Products

Animal Products plays an important role in the socio- economic life of India. It is a rich source of high quality of animal products such as milk, meat and eggs. India has emerged as the largest producer of milk with 16.43 percent share in total milk production in the world. India accounts for about 4.95 percent of the global egg production and also the largest population of milch animals in the world, with 112.9 million buffaloes, 157 million goat and 74.5 million sheep (APEDA; 2014). Exports of animal products represent an important and significant contribution to the Indian Agriculture sector. The export of Animal Products includes Buffalo meat, Sheep/ Goat meat, Poultry products, Animal Casings, Milk and Milk products and Honey etc.

Based on comparative positioning of Focus States vis-à-vis other States in India and the current production potential for various animal products, various animal products are selected for further analysis. Following sub-sections cover the export potential analysis for Select Animal Products viz. Egg and Buffalo Meat from the Focus States.

3.2.10.1. Egg

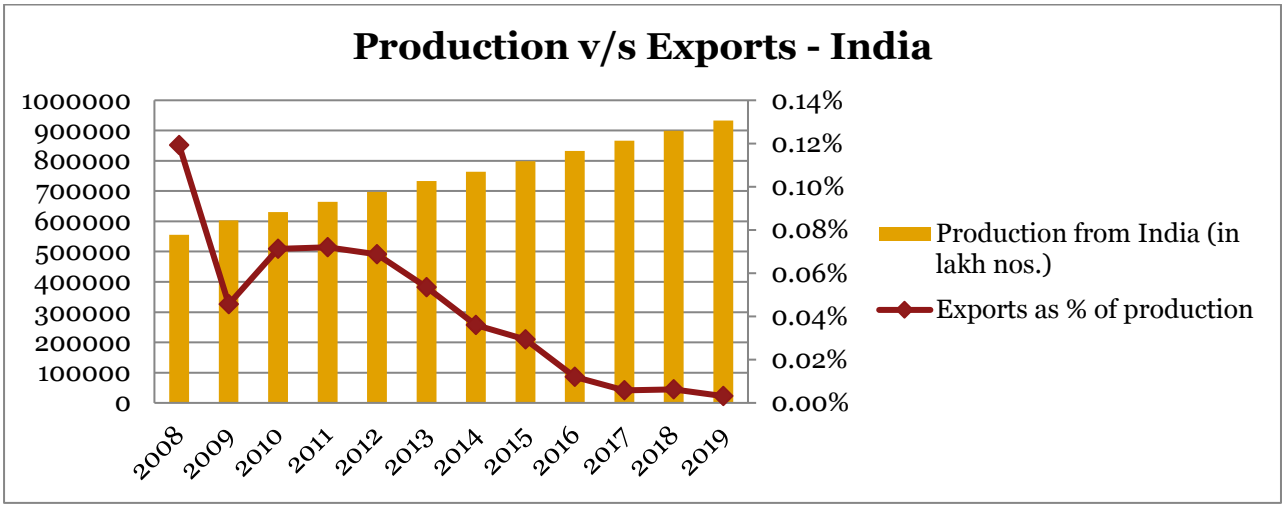
Egg is one of the most important poultry products in India. Currently India is the third largest producer of eggs in the world. In India, Andhra Pradesh is the leading egg producer with 212103 lakh eggs (DAHF; 2013)[17].

India's share in the global egg production stands at 6 percent followed by countries like China, and United States. In terms of exports, the top 4 exporters of eggs are Netherland, Turkey, Poland and US. The overall global trade in egg is expected to be of the order of 3466 Million USD[18] and India's share in the total exports of eggs stand at 9% of the total quantity exported around the world. So it can be concluded that although India contributes a major share of the global egg production, its export in the international market is very low. This can be attributed to high domestic consumption.

[17] Basic Animal Husbandry Statistics 2013
[18] UN Comtrade

3.2.10.1.1. Analysis of Egg exports from India

On an average, India exports less than 1% (0.04%) of its total production of eggs on an annual basis. Production is expected to grow at a CAGR of 4.09% over next 5 years to reach 681.33 MT by 2019 (933330 Lakh nos[19]). Figure 53 depicts the growth in production and exports based on past 10 year actuals and projections for next 3 years.



Source: UNComtrade, DAHF; 2014, PwC Analysis

Figure 56: Production and Export volume projections for India (3 yrs.)

This gap between production and exports may be attributed directly to increase in domestic consumption of egg and indirectly to increase in per capita consumption of chicken in India, owing to changing eating habits; predominantly in the metro cities, improving prosperity and changing lifestyles and lower chicken prices. The overall poultry sector in India is poised to grow at 8-10%.

Competition Scenario:

Afghanistan (24%), Oman (18%), Angola (13%), Pakistan (9%), Liberia (7%) and Maldives (8%) together constitute more than 80 percent of the total egg exports from India[20]. In these key export markets, India holds a strong position with 32% market share. It faces competition from USA, UAE & Pakistan.

It can be inferred from above data that there exists opportunities for India to strengthen its hold in the current export markets and simultaneously, also explore opportunities in newer markets in Europe and South East Asia viz. the Netherlands, Germany, France, Singapore and China.

3.2.10.1.2. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 10 years and, using the least square method, project the same over next 5 years (though it has been fluctuating over the years), we see that Indian Egg exports are expected to reach 681.33 MT by 2019 (933330 Lakh nos) of annual exports by 2019.

[19] Assuming average weight of an egg, including shell, is 0.73 Kg
[20] UN Comtrade; PwC Analysis

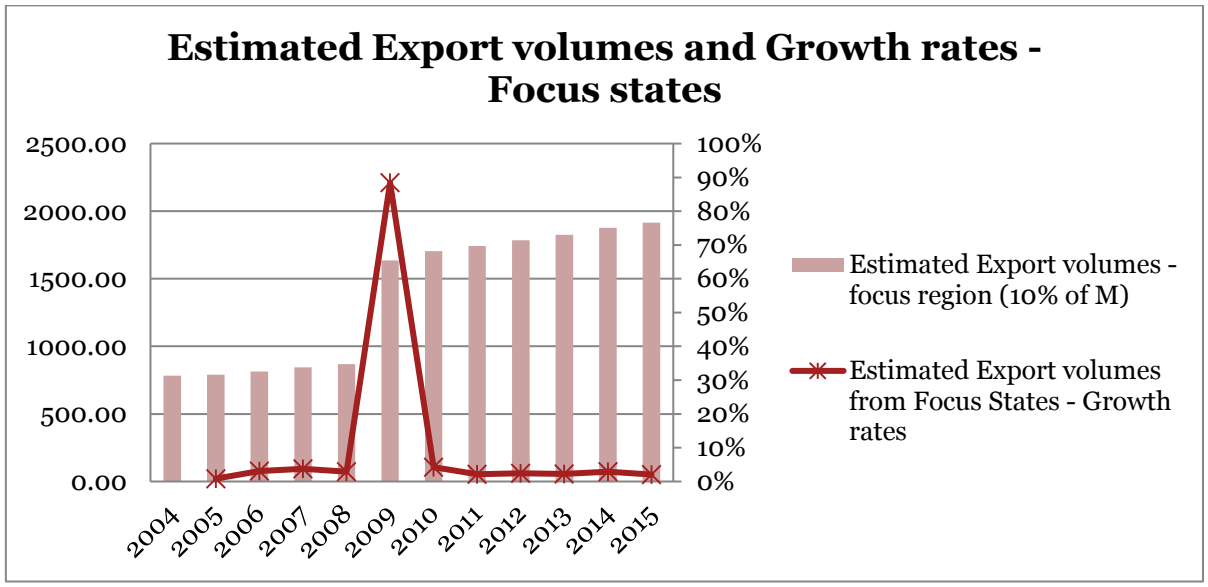
How much from Focus States –

Amongst the Focus states, Haryana ranks 4 and Punjab ranks 5 in terms of annual egg production in the country in FY 2013-14. Together the Focus States represent 11% of the national production of eggs.

In order to estimate the contribution of Focus states in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 1.40 MT of eggs (1916 Lakh eggs) by 2019 from the focus states of Punjab, Haryana & Himachal Pradesh.

Figure 54 depicts the estimated export volume projections for next 3 years and the expected growth rates over these years in the Focus States.



Source: UNComtrade, PwC Analysis

Figure 57 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 5 year period

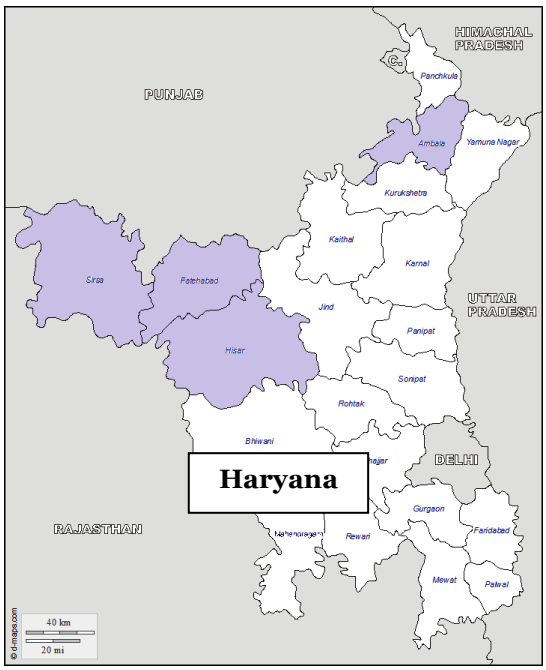
2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

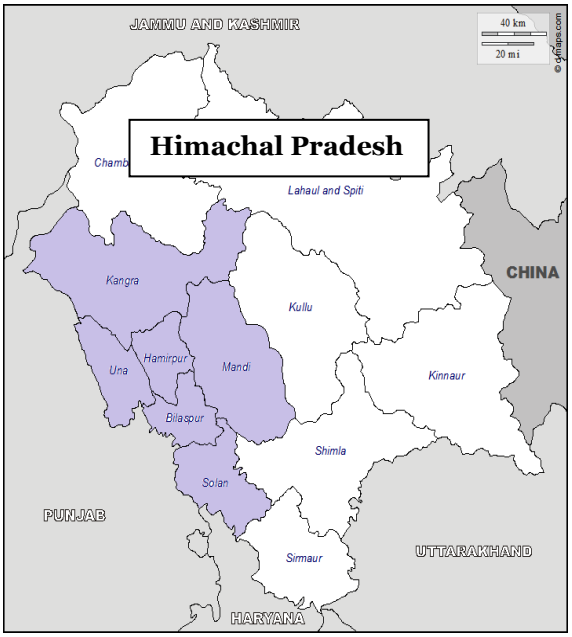
Based on these assumptions, it is projected that the export of Eggs from the Focus States is expected to grow at a CAGR of 10% to reach 1.40 MT/1916 eggs (rounded off) on an annual basis.

The cluster to be covered consists of the following districts in the respective states:

1. **Punjab:** Hoshiarpur, Ludhiana, Jalandhar, Sangrur
2. **Haryana:** Ambala, Hisar, Fatehgarh, Sirsa
3. **Himachal Pradesh:** Kangra, Mandi, Solan, Bilaspur, Hamirpur, Una

Figure below depicts the major production centers in each of the Focus States.





3.2.10.1.3. Crop Specific Recommendations to boost exports

Appropriate infrastructure is required to support the export operations. The potential for raw egg is high when compared to processed egg products like egg powder, egg albumin etc. as per the key exporters and also the processed products have higher shelf life, therefore they don't require any infrastructure which is required to support exports of raw perishable egg. However, reefer containers for exports of raw eggs could be considered for near future.

As per the locations shown in the above figure, we have identified that these additional reefer containers could be provided at the Ludhiana ICD which is at the minimum distance from all the major egg producing districts.

Figure 58: Proposed location for suggested infrastructure for Eggs

3.2.10.2. Buffalo Meat

According to OECD-FAO Agricultural Outlook for the period 2011 to 2020, World meat production growth is anticipated to slow to 1.8% p.a. dampened by higher costs during the Outlook period, as compared to 2.1% p.a. for the previous decade. On the contrary, world meat exports are expected to increase by 1.7% p.a. in the Outlook period, as compared to 4.4% p.a. in the previous decade. The export volumes will be driven mostly by an expansion of poultry and beef shipments.

Brazil, EU, China & India are the top producers of Buffalo & Veal meat in the world. They together contribute almost 50% of the global production of Buffalo & Veal meat in FY 2013-14.

The total global trade in Buffalo Meat amounts to 21519 Mn USD with export volumes of around 3.51 MMT/annum. India holds a meagre share of less than 1% in the global trade. USA (11.5%), Netherlands (10.8%), Australia (8%) and Germany (7.7%) are the top exporters of Buffalo Meat in the world (2013-14).

Table below gives details on top exporters (based on export volumes), export quantity and their share in global trade.

Table 18: Major Buffalo Meat Exporters in the world (2013-14)

Global ranking	Area	Export Qty. (in Mn MT)	Share in Global Trade (%)
1	USA	0.40	11.5%
2	Netherlands	0.38	10.8%
3	Australia	0.28	8.0%
4	Germany	0.27	7.7%
26	**India**	**0.02**	**0.50%**

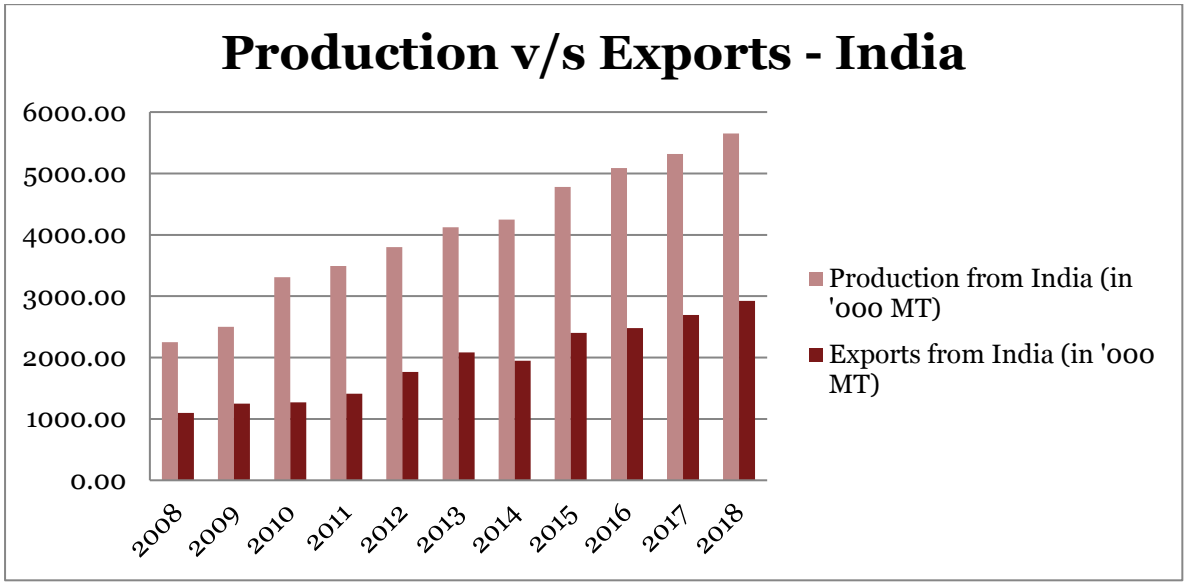
Source: UNComtrade, PwC Analysis

3.2.10.2.1. Analysis of Buffalo Meat exports from India

Indian buffalo meat is one of the largest agricultural exports (by value) in the country, after guar, rice and seafood. In coming years the sector is expected to grow at a CAGR of 15%. Active participation of the private sector along with government schemes on salvaging and rearing of male buffalo calves is expected to augment the availability of livestock in coming years. Indian buffalo meat is also witnessing strong demand in international markets due to its lean character and near organic nature. A recent report by the Foreign Agricultural Service (FAS) of USDA states that for the second year in a row in 2013 India will be the world's largest beef exporter has drawn attention to the meat trade industry.

On an average, India exports 50% of its total production of Buffalo Meat annually. In FY 2013-14, Vietnam Social Republic, Malaysia, Egypt Arab Republic, Thailand, Saudi Arabia and Jordan were the major export destinations for Indian Buffalo exports.

Production is expected to grow at a CAGR of 5% over next 5 years. Consequently, exports are expected to grow at a modest CAGR of 3.33% to reach 2,69,2000 MT by 2019. Figure below depicts the growth in production and exports over a 7 year period and projections for next 3 years.



Source: US-FDA, DAHF (GoI) ; 2014 , PwC Analysis

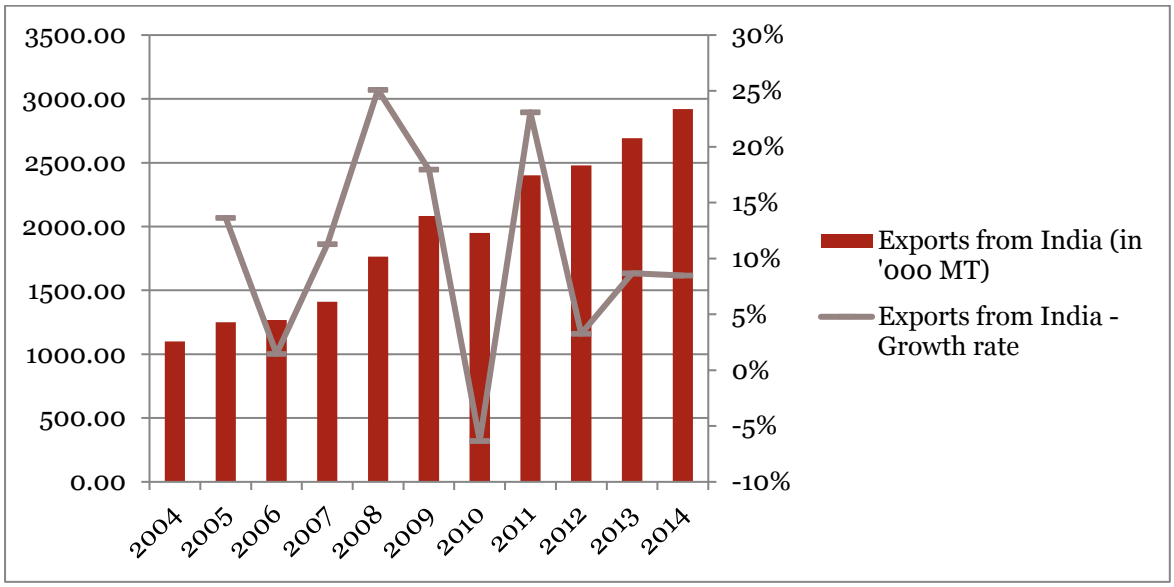
Figure 59: Production and Export volume projections for India (5 yrs.)

3.2.10.2.2. Projection of Exports

Projecting India's export over next 5 years based on last 10 years' performance -

If we assess trade volume trend over past 7 years and, using the least square method, project the same over next 3 years, we see that Indian Buffalo Meat exports are expected to grow at a cumulative CAGR of 3.33% to reach 2921000 MT of annual exports in 2019.

Figure below depicts the export trend over the years and projections for next 5 years:



Source: UNComtrade, PwC Analysis

Figure 60 Export volume projections and growth rate for Buffalo Meat from India based on linear forecasting (3 yrs.)

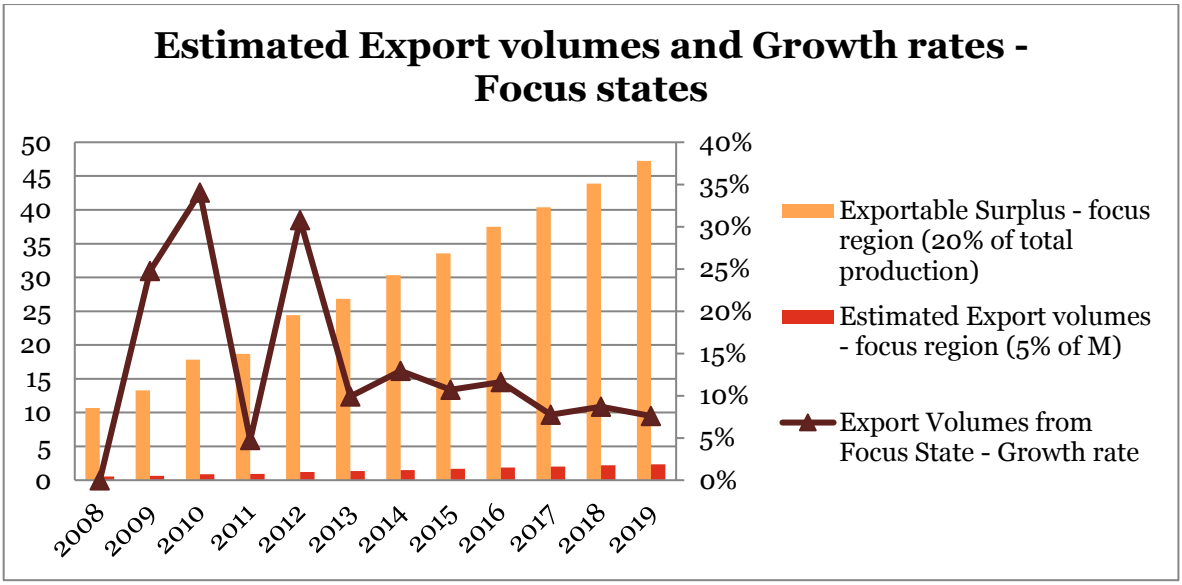
How much from Focus States –

Uttar Pradesh, Andhra Pradesh, Maharashtra and Punjab are the major Buffalo Meat producing areas in the country. Amongst the Focus States, Punjab ranks 2 in terms of national production, contributing 11% of national production of Buffalo Meat.

In order to estimate the contribution of Focus states in these projected export volumes, exportable surplus from the focus states was calculated by applying Pareto's principle – 20% of the total production volumes were considered as exportable surplus. It was assumed that 80% of the total production was either consumed (processed or raw) domestically/within India with some margin for port harvest losses.

The estimated export volumes from the Focus States were calculated using the Exportable surplus as the base. The average production to export ratio was applied on this to arrive at the estimated export volumes of 2361 MT by 2019 – a cumulative average growth rate of 10% is expected in the focus state of Punjab.

Figure 58 depicts the estimated export volume projections for next 3 years with the expected growth rates over these years in Punjab.



Source: UNComtrade, PwC Analysis

Figure 61 Estimated Export volumes and Growth rates - Focus states

Based on the information above, in order to keep the estimations as realistic as possible, we have made following assumptions:

1. On a conservative note, this estimation is based on the assumption that exports as a percentage of production will remain same over the 3 year period

2. On an average, ratio of exports and production quantity at the national level and at the state level are assumed to be same

Based on these assumptions, it is projected that the export of Buffalo Meat from the Focus State of Punjab is about 2361 tons only.

3.2.10.2.3. Crop Specific Recommendations to boost exports

In order to ensure quality of fresh Buffalo Meat exports during long haul transits and microbiological safety of the exported products, a cold storage facility and a Gamma irradiation facility are required in the state. Gamma irradiation facility is under the purview of specialized government authorities and therefore, cannot be created within/around residential areas. Access to nearest gamma irradiation facility should be enabled. Considering the cold storage requirements, the state already is in excess of cold storage capacity (13, 45,000 MT over required capacity of 13,18,000 MT), no new cold storage facility is recommended. However, considering the gaps in cold storage capacities in Haryana, a cold storage is recommended within the state to cater to additional volumes of perishable exports.

In addition to fresh meat exports, there also exist substantial opportunity for value added products (such as Sausages & Canned Meat, Homogenized Meat Preparations, Preserved Meats, Meat Extracts & Meat Juices, etc.) Considering that India has already established ten state-of-art mechanized abattoirs-cum-meat processing plants in various states based on export requirements in coming years and several more are under construction for slaughtering buffaloes and sheep, no additional processing infrastructure have been recommended for short to medium term. These slaughterhouses-cum-processing units will utilize all slaughterhouse byproducts in the production of meat-cum-bone meal,

tallow, bone chips and other value-added products. These plants will have exports as a major focus and hence, will follow all the sanitary and phyto-sanitary measures required by the International Animal Health code of World Organization for Animal Health (O.I.E.).

3.3. Summary of infrastructure requirement in the Focus States

The previous section discussed the potential of the state in terms of availability of the exportable commodities. The current status of the exports from the state and India as a whole is minimal when compared to the total potential available with the state to export. One of the critical factors is the unavailability of the supporting infrastructure to facilitate smooth logistics and reservation of food quality. Good infrastructure facilities ensure the proper delivery and safety of the exported product along with savings in time and cost.

In the Focus Region of Punjab, Haryana & Himachal Pradesh, the commodities with significant potential for export are:

- Citrus fruits/Kinnow, stone fruits, Peas, potato, garlic and other assorted fruits/vegetables, Barley and Animal Products viz. Egg and Buffalo Meat from Punjab
- Apples, Exotic fruits & nuts (such as Kiwi, walnuts and stone fruits), Peas and assorted vegetables (viz. Capsicum, chillies and tomatoes) and floriculture products (viz. Carnation, Chrysanthemum) from Himachal Pradesh
- Barley, Peas & assorted vegetables (carrots, green chillies, cabbage, cauliflower, radish), floriculture products (viz. Chrysanthemum, Gladiolus, Tube Rose) and egg from Haryana

Although these commodities are already being exported from the Focus States but due to lack of infrastructure their actual potential is yet to be achieved. The infrastructure gaps are present in the form of non-availability of pack houses / non-availability of reefer vans for transportation of perishable commodities, non-availability of refer containers for transport of commodities to sea ports, pre-cooling facilities, processing facilities etc. Plugging these gaps will assist the development of the export trade.

The details of the proposed infrastructure along with the proposed capacities and estimated investment in the identified districts have been provided in this chapter.

Table 19: Summary of Infrastructure required for various potential products/commodities

Sr. No.	Product/ Commodity Identified	Harvesting window (in Days)	Potential Surplus available for Exports (in MT)	Per day capacity of infra-structure reqd.	Type of Infrastructure Required	Standard Capacity of Infrastructure	No. of Dedicated Units reqd.	Remarks
1	**Apple**	120	9200	77	Packhouses	60 MT	1	
					Multi Juice & Pulp unit	25 MT/day	1	To be shared with citrus fruits
2	**Citrus Fruits**	120	24000	200	Packhouses	60 MT	3	
					Multi Juice & Pulp unit	25 MT/day	1	
3	**Stone Fruits**	120	751	6	Packhouses	60 MT	NR	To be shared with citrus fruits
					Multi Juice & Pulp unit	25 MT/day	1	To be shared with Citrus Fruits and vegetables
4	**Strawberry**	150	9	0.15	Packhouses	60 MT	NR	To be shared with citrus fruits
				0.36	Multi Juice & Pulp unit	25 MT/day	NR	To be shared with Citrus Fruits and vegetables
				0.009	Cold Storage	1000 MT (multi commodity)	1	Common for all perishables
5	**Kiwi**	90	1000	11	Packhouses	60 MT	NR	To be shared with citrus fruits
					Multi Juice & Pulp unit	25 MT/day	NR	To be shared with Citrus Fruits and vegetables
6	**Walnuts**	150	50	0.83	Packhouses	60 MT	NR	To be shared with citrus fruits

Sr. No.	Product/ Commodity Identified	Harvesting window (in Days)	Potential Surplus available for Exports (in MT)	Per day capacity of infra-structure reqd.	Type of Infrastructure Required	Standard Capacity of Infrastructure	No. of Dedicated Units reqd.	Remarks
7	**Peas**	300	1910	6	Packhouses	60 MT	NR	To be shared with Assorted vegetables
					IQF Facility	400 MT/day	NR	To be shared with Assorted vegetables
8	**Potato**	120	8194	68	Packhouses	60 MT	1	
9	**Assorted Fruits/ vegetables**	180	7000	39	Packhouses	60 MT	1	
					IQF Facility	400 MT/day	1	
					Multi Juice & Pulp unit	25 MT/day	NR	To be shared with Citrus & Exotic fruits
10	**Garlic**	90	126	0.95	Packhouses	60 MT	NR	To be shared with assorted vegetables
11	**Flori-culture products**	120	50	0.05	Flower Grading/sorting line	9000 stems /Hr.	1	
				0.008	CPC @ Amritsar airport**	6000 MT/annum	1	Common for all perishables
12	**Barley**	120	5722	48	Malting Unit	400 MT/day	Optional	
13	**Millets**	120	10963	91				
14	**Eggs**	All year	1.4	0	Reefer containers*	40 feet container*	Optional	
					Irradiation Facility	10 MT/hr	1	Common for all animal products

Sr. No.	Product/ Commodity Identified	Harvesting window (in Days)	Potential Surplus available for Exports (in MT)	Per day capacity of infra-structure reqd.	Type of Infrastructure Required	Standard Capacity of Infrastructure	No. of Dedicated Units reqd.	Remarks
15	**Buffalo Meat**	All year	2361	6	Reefer containers*	40 feet container*	NR	To be shared with other perishables
					Irradiation Facility	10 MT/hr	NR	Common for all animal products

LEGEND:

NR = Not Required

Standard capacity of pack house – Unit: Installed capacity/day

*The capacity of each 40 ft reefer container is 472320 eggs (Assuming average weight of an egg, including shell, is 0.73 Kg)

**Conditional to international airport being fully operational

Cost of the facilities

Sr.No	Allocated States	Proposed Infrastructure	Placement Location	Capacity of the proposed infrastructure	Estimated cost (in lakh)	Number of Units	Total cost in Lakh Rs
1	Himachal Pradesh	Pack House	Mandi, Kinnaur & Kullu	60 MT	700	3	2100
		Multi Juice and Pulp Unit	Gumma	25 MT/day	100#	2	200
		Flower Grading sorting packing line*	Palampur	9000 stems /Hour	910	1	910
		TOTAL					**3210**
2	Punjab	Pack House	Jalandhar & Ludhiana	60 MT	700	2	1400
		Multi Juice and Pulp Unit	Firozepur	25 MT/day	100#	1	100
		TOTAL					**1500**
COMMON INFRASTRUCTURE (to be shared between states):							
5.	Haryana & Himachal Pradesh	Multi Commodity Cold Storage		1000 MT	120	1	120
6.	Punjab & Haryana	Malting Unit		400 MT/Day	2700	1 (Optional)	-
7.	Punjab, Haryana & Himachal Pradesh	IQF Facility		40 MT/day	1800	1	1800
8.	Punjab, Haryana & Himachal Pradesh	Reefer Containers**		40 Ft. container*	100	1 (Optional)	-
9.	Punjab, Haryana & Himachal Pradesh	Perishable cargo Center at Amritsar***		6000 MT/Annum	710	1	710
10.	Punjab, Haryana & Himachal Pradesh	Protected Cultivation Unit (for exotic & high value horticultural products)		Location in Himachal to be decided based on further assessment	Will be determined based on partnership modalities	1	-
	Total						**7340**

Capacity enhancement of existing lines

Standard capacity of packhouse – Unit: Installed capacity/day

*Integrated pack house included
** The capacity of each 40 ft. reefer container is 472320 eggs (Assuming average weight of an egg, including shell, is 0.73 Kg)
***Conditional to international airport being fully operational

Pack House
Consists of –

1. Grading sorting facility – 60 MT / Day
2. Pre-cooling and Cold Store Facility – 300 MT

Center for Perishable Cargo (facility at Delhi Airport Taken as reference)	
Total Area	1127 Sq. Mtr.
Cold Room-1	**Live Stock Products**
a) Space	480 Cubic Mtrs.
b) Temperature	0°Cel. To 4°Cel.
c) Capacity	12 Aircraft Pallets
Cold Room-II	**Fruits & Vegetables**
a) Space	480 Cubic Mtrs.
b) Temperature	10°Cel. To 12°Cel.
c) Capacity	12 Aircraft Pallets
Cold Room-II	**Fresh Flowers**
a) Space	480 Cubic Mtrs.
b) Temperature	0°Cel. To 4°Cel.
c) Capacity	12 Aircraft Pallets
Pre Cool Room:	**254 Cubic Mtrs.**
a) Space	0°Cel.
b) Temperature	(Capable of cooling 10 tons Products from 25° To 5° In 8 Hrs.)
c) Capacity	
Examination Area:	
a) Space	2024 Cubic Mtrs.
b) Temperature	+ 16°Cel.
Work Station	2 Nos.
ETV Corridor (Elevating Transfer Vehicle)	
a) Space	996 Cubic Mtrs.
b) Temperature	+ 16°Cel.
Walk Corridor	
a) Space	846.65 Cubic Mtrs.
b) Temperature	+ 16°Cel.
Receiving Area	
a) Space	192 Cubic Mtrs.
b) Temperature	+°Cel.
ETV Handling Capacity	15000 lbs. Or 6803 Kgs.
Engine Room	Space Equivalent to one 40ft. sea container

Flower Grading Sorting and Packing line –

Fully automatic grader for –

1. Stem length
2. Ripeness
3. Bud-height
4. height of the flower bud
5. automatic bunching,
6. automatic binding and cutting

Other features –

1. optional: 2-level bunching
2. Maximum number of grades/stations: 10
3. Capacity up to 9,000 stems per hour
4. Price range: € 120,000 and € 300,000

4. Assessment of Exit Point Infrastructure

4.1. Exit point Infrastructure

Infrastructure requirements at ports are defined by various structural and operational factors to ensure safe and timely transportation of quality products. Structural factors namely nature of the product (fragile, perishable, temperature sensitive, etc.), shelf life of the produce, packaging and quality requirements of the importing country and operational factors such as mode of transportation deployed, overhauls & lead times, transportation conditions (moisture percentage, humidity levels, temperature fluctuations in transit), etc. play a crucial role in determining the way in which the cargo will be transported i.e. either bulk or containerized and the mode of transportation (air freight or sea shipment).

Depending on the specialized nature of agricultural commodities, agricultural produce can be broadly categorized as bulk cargo or containerized cargo:

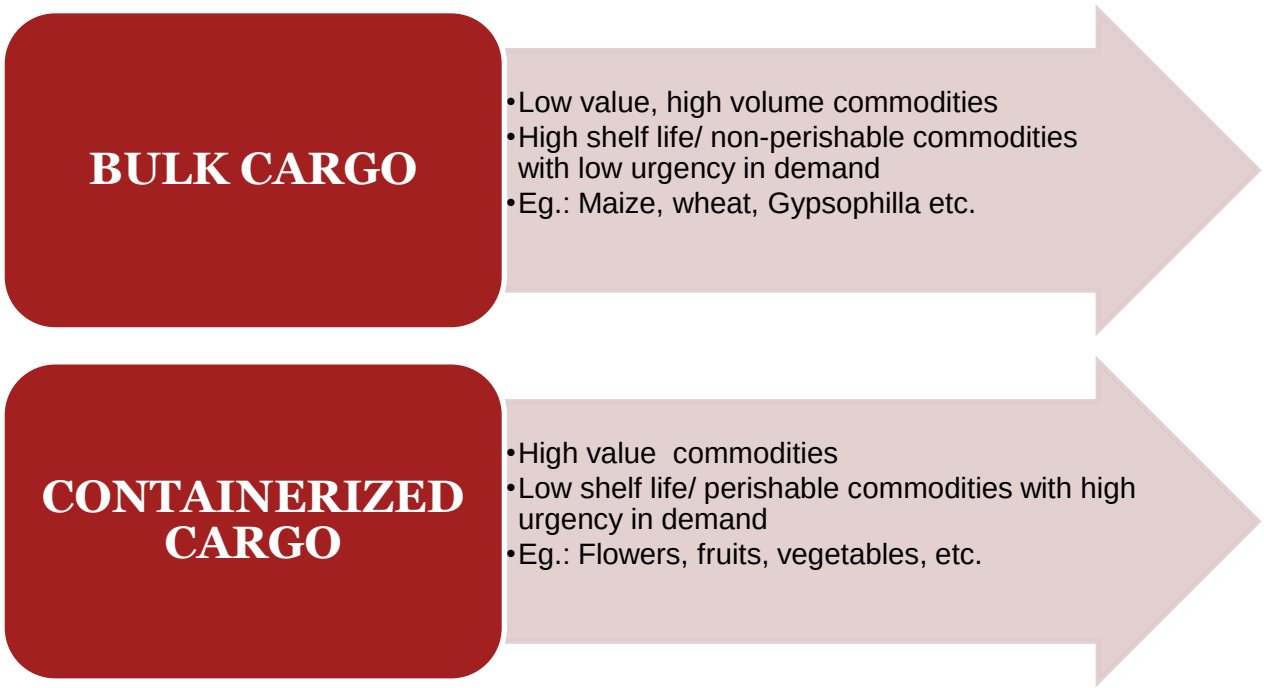


Figure 62: Methods of cargo handling of agricultural commodities for export purposes

4.1.1.1. Bulk Cargo:

Bulk cargo is commodity cargo that is transported unpackaged in large quantities. Material in either liquid or granular/particulate form, as a mass of relatively small solids, such as petroleum/crude oil, grain, coal, or gravel, are transported as bulk cargo.

The cargo is usually carried loose in ship's hold, and loaded and discharged through hatchways. Usually, panamax or post-panamax vessels, with huge holding capacity are used for transporting bulk cargo. Such vessels require a

minimum draft of 39.5 ft (12.04 m) in Tropical Fresh Water (TFW)21. The salinity and temperature of water affect its density, and hence how deep a ship will float in the water. Specialized ships with tankers are used for transportation of liquid cargo.

Type of Cargo transported as Bulk:

Transport through sea freight attracts risks (such as risk of physical damage and quality deterioration through hostile weather and climatic conditions during transit, inappropriate storage conditions, etc.). Also, both the lead times and risks associated with sea freight are high and least controllable, therefore, predominantly low value and high volume commodities are transported through sea freight. High volume commodities bring in economies of scale counterbalancing the high freight costs involved in sea transportation.

Sea freight is also a preferred option for commodities with high shelf life and low urgency in demand such as grains, coal, POL, etc. High volume and high shelf life commodities such as Grains (maize, wheat and unpolished/non-branded rice), low value and low demand urgency products such as flower fillers like gypsophilla are transported) are transported through sea freight.

4.1.1.1.1. Specialized Requirements at Ports to handle bulk cargo:

1. Cargo handling equipment:
    a. **For on-loading and off-loading of cargo**: Front loaders, hoppers, elevators (US) or silos for grain - they may be operated by pneumatic suction which sucks the grain out of the ship's hold, quay cranes or floating cranes for general cargo, etc.
    b. **For facilitating movement of cargo to and from the ship's side and the transit shed:** Four-wheeled trucks either manually or mechanica1ly propelled, and mechanically or electrica1ly propelled tractors for hauling four wheeled trailers, ro-ro trailers, conveyor belts, etc.
2. Open and covered warehouses for storage purposes to ensure in-transit storage and quality of the produce
3. Hinterland connectivity by road & rail for efficient, cost effective and timely delivery of the produce

4.1.1.2. Containerized Cargo:

Cargo transported in large standardized, sealed containers whose contents do not have to be unloaded at each point of transfer.

Loose cargo is packed in standard 20 feet or 40 feet metal containers. Exporter may choose to opt a Full Container Load (exclusive 20 feet or 40 Feet container with consignments from one exporter/consignee) or Less than Container Load (container to be shared with other consignees/exporters) based on the volume of the goods transported, sensitivity and nature of cargo and urgency in demand (LCL shipment can depart only when the complete container is filled).

Shipment by container load continues to be the preferred method for export and import goods because it is much more efficient, allowing ships to spend less time in port. The use of containers to unitize cargo ensures efficient transportation, supply and storage keeping the quality of the product untampered. Containers offer a more flexible option for smaller exporters as well as importers. Containers are available in various volumes and in a number of specialized constructions to accommodate various cargo types, including reefer containers for highly perishable or temperature sensitive products.

[21] The name and definition of TFW is derived using the freshwater Lake Gatún as a reference, since this is the determination of the maximum draft.

Type of Cargo preferred to be transported as Containerized cargo:

Containerized cargo safeguards the product from various physical risks faced by the cargo during sea freight. High value and medium to low shelf life products such as fruits viz. grapes, apple, bananas, fruit pulps, processed fruits & vegetables and low volume and/or highly sensitive (both in terms of quality requirements by importing country and nature of the product) food grade commodities are transported through container cargo. Reefer containers can be used for highly temperature sensitive products such as meat, eggs and frozen fruits and vegetables. Vented containers are used for moisture-sensitive goods like tobacco, spices and coffee to allow for appropriate ventilation and thus eliminate potential condensation, preventing damage. Typical process flow deployed while transporting cargo by sea freight is as follows:

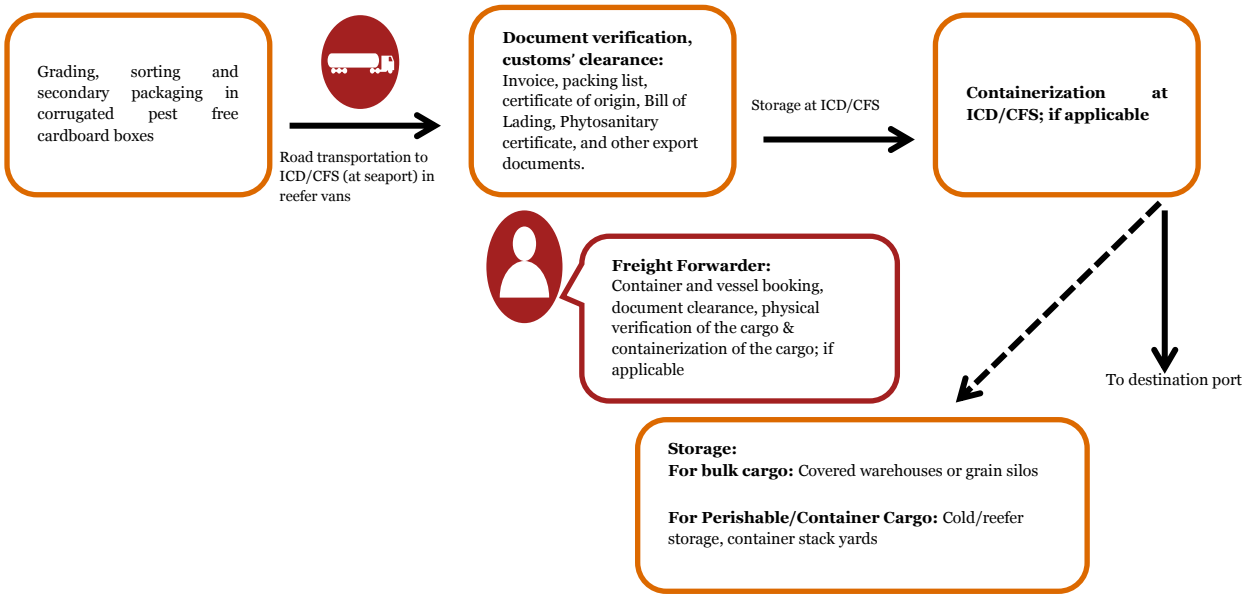


Figure 63: Typical process flow for transporting cargo (both bulk and containerized) by sea freight

High value products with high demand urgency and extremely low shelf life are transported via reefer containers through air freight. Containerization of cargo also provides better handling and allows for use of multi modal transportation modes to ensure timely delivery with uncompromised quality. Typical process flow deployed while transporting cargo by air freight is as follows:

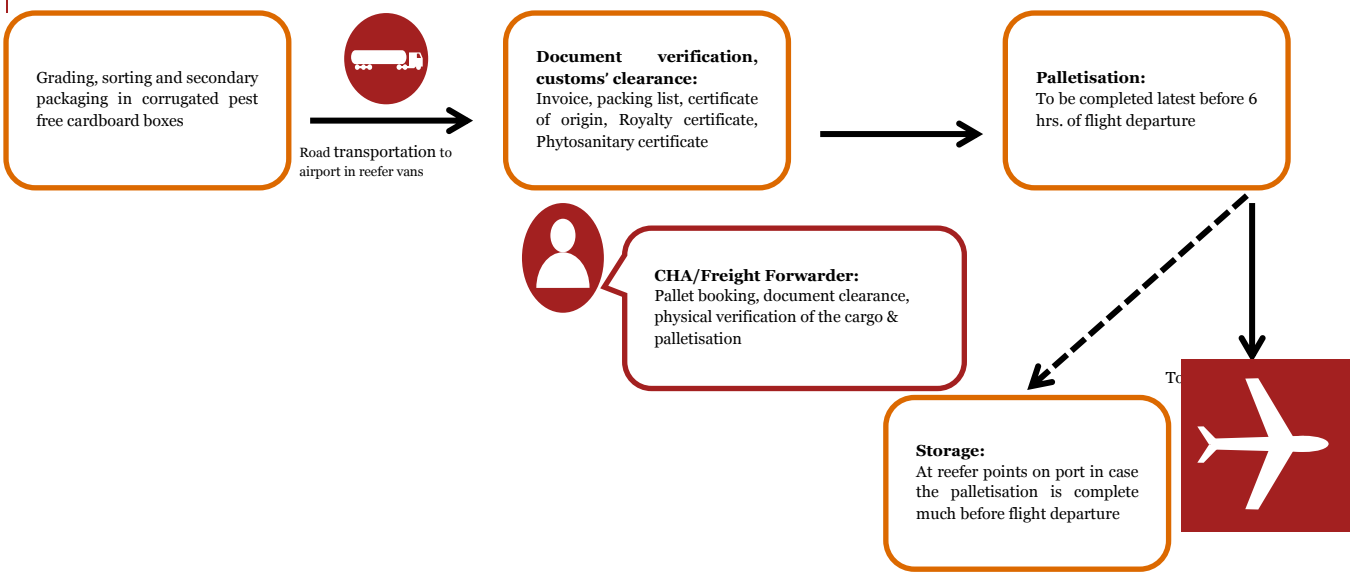


Figure 64: Typical process flow for transporting cargo by air freight

More than 80% of the cargo handled globally is containerized today, others are gradually moving towards containerized cargo. Around 12 percent of global trade in agricultural goods such as oilseeds and grains, traditionally shipped in bulk, was shipped via container in 2012, data from shipping consultancy Seabury Group showed. Ports are also renovating/upgrading, to respond to this shift in customer preferences, to better equip them to handle container cargo.

4.1.1.2.1. Specialized Requirements at Ports to handle Container Cargo:

1. Dedicated container terminals, with proper berthing facilities, to handle container ships and manage container cargo
2. Cargo handling equipment:
    a. **For on-loading and off-loading of cargo**: quayside container cranes, i.e. container gantries also called shiptainers.
    b. **For facilitating movement of cargo to and from the ship's side and the transit shed:** Transtainers or stacking cranes, straddle carriers, van carriers, front and side loading fork-lift trucks, etc. are used for moving and stacking containers within the terminal up to five-high, i.e. five containers one above the other. Mechanically powered straddle carriers are designed to distribute containers on the quay and on the terminal. Fork lift trucks (FLT) are mechanically or electrically operated and fitted in front with a platform in the shape of two prongs of a fork; lifting capacity varies from 1 to 45 tons.
3. Container stack yards with/without reefer points, refrigerated warehouses for storage purposes
4. Availability of Container Freight Stations (CFS) to handle high on-site container traffic and adequate connectivity with neighboring Inland Container Depots (ICDs) to consolidate cargo volumes from neighboring landlocked states.
5. ICDs/CFS offer services for handling and temporary storage of import/export laden and empty containers carried under customs control and with Customs and other agencies competent to clear goods for home use, warehousing, temporary admissions, re-export, temporary storage for onward transit and outright export. Transshipment of cargo can also take place from such stations.

6. **Center for Perishable Cargo (CPCs):**

These are dedicated terminals on airports specially designed to cater to agricultural products with extremely low shelf life such as cut flowers, ornamentals, frozen meat, frozen vegetables. These centers provide controlled storage conditions, documentation and customs' clearance with on-site Phyto-sanitary and quality inspection laboratories to ensure physical inspection of produce under a continuous, controlled temperature zone.

4.2. Exit Point Infrastructure Assessment for the Focus States

4.2.1. Comparative Assessment of Infrastructure available at Major Ports

In order to assess the existing infrastructural capabilities and to identify existing gaps in infrastructure, required to manage the expected influx of agricultural commodity exports to major international target markets, a comparative assessment of various airports was done. Infrastructure requirements at exit points were assessed with focus on select commodities from the focus states of Punjab, Haryana & Himachal Pradesh with high production base in these states, comparative regional advantage and huge prospective export potential. Nonetheless, it has also been ensured that capacities developed will be in line with national export trends and requirements. Only major airports in Northern India are evaluated under this study. Considering that the Focus States are a landlocked territory, assessment of sea ports is not undertaken. This selection is considering the fact that proximity of the port is not the only criteria in port selection for transportation of a given commodity to a said destination. It depends upon the nature of commodity, type of cargo handled (containerized/bulk) and underlying capabilities, sectors/destination ports covered by the given port and shipping line operations. These all factors, in turn, depend upon various commercial preferences and operational priorities.

Table 20: Select airports

	Delhi Airport	Amritsar Airport	Mumbai Airport
1. Sectors covered	57 airlines operating to cover various sectors	Arrivals for all international traffic. Departures to Afghanistan, Russian Federation, Qatar , etc. through Air India, Air India Express, Turkmenistan Airlines, Uzbekistan Airlines, Qatar airways 1 international terminal	China, US, UK, Japan, Malaysia, Iran, Kenya, Ethiopia, Qatar, France, Switzerland, Saudi Arabia, Turkey, Mauritius, UK, Thailand
2. Container Terminal/ Air Cargo Complex/Terminal	Dedicated State of art of Center for Perishable Cargo spread over an area of 1127 sq. mt.: - X-ray screening facility for perishable cargo - 1 pre cool room and 1 examination area to facilitate customs' clearance and other documentation - 3 cold rooms – one each for livestock products (0 – 4 deg C), F&V (10-12 deg C) and flowers (0 – 4 deg C) - ETV (Elevating Transfer Vehicle) corridor and handling room for handling container cargo	1 dedicated cargo terminal with an area of 2256 sq. mtr.	Dedicated Cargo terminal, MIAL Cargo
3. Container Cargo handling capabilities	On an average, 140,000 to 200,000 MT of export cargo is handled by the airport every year. **CPC:** Utilization activity per day = 228 Pallets ,146 containers Tonnage handled YoD in 2010-2011 = 1,31,347 MT Import Disposal Area = 12,643 Sq. Mtrs Destuffing Activity per day Shift (Avg):85 Pallets/35 Containers (Avg. 425 MT)	Details not available	Details not available

	Tonnage Handled (2010-11) = 144,410 MT (+ 10% growth) MT		
4. Storage Capacity	348 ULD storage positions 6 mechanized built up stations with 24 build up positions Covered area of 340000 sq. mtrs Import Warehouse = 37,000 Sq. Mtrs	a) Separate storage area for dangerous goods b) Adequate truck dock area c) Separate cargo bay for parking the cargo A/craft	d) Trans-shipment cargo storage facility b. Cold Storage: Export state-of-the-art e) Perishable Centre: Temp. range: +15 to +25 ^{o}C, +2 to +8 ^{o}C, 0 to -10 ^{o}C , One time holding capacity: 160 Tons, Annual Handling capacity: 50,000 Tons f) Cold Storage: Temp. range: +15 to +25 ^{o}C, +2 to +8 ^{o}C, One time holding capacity: 120 Tons, Annual Handling capacity: 30,000 Tons
5. Port Infrastructure	Accredited Phytosanitary labs and quality inspection agencies are required on-site to ensure on-site physical verification of cargo.	Good hinterland connectivity with Ludhiana, Chandigarh and Amritsar Railway station in Punjab and few districts of Haryana.	Regulators available on-port: Indian Customs, Animal Quarantine, Plant Quarantine, Drug Control, Airport Health Officer, Food Safety & Standards Authority of India, Wild Life Protection Authority and Bureau of Civil Aviation Security
6. CFS Space	Not available	Details not available	Not available
7. Cargo handling equipment/facilities	Owned by CTO	Details not available	Owned by airline
8. CPCs	Yes	No, but required	Yes, increase in capacity required

Source: Respective website of airports and Airport Authority of India website (http://www.aai.aero/public_notices/aaisite_test/main_new.jsp)

Table 21: ICDs/CFSs in Focus States

STATE	PUNJAB	HARYANA	
ICDs	**ICD Ludhiana**	**ICD Garhi Harsaru**	**ICD PBH**
Locations catered to	Punjab, Himachal Pradesh, Chandigarh, Jammu & Kashmir and northern Haryana.	NCR (Gurgaon, Manesar, Faridabad, Ghaziabad), Haryana (Hisar, Panipat, Sonepat) and Rajasthan (Bhiwadi, Rewari, Dharuhera, Neemrana).	Faridabad, Ballabhgarh, Palwal and Noida
Capacity Handled (annually)	300,000 TEUs capacity	2,60,000 TEUs per year	150,000 TEUs
Agri commodities handled	Non-Basmati rice, Dairy products, cereal preparations, Fresh grapes and assorted vegetables, walnuts, etc.	Buffalo Meat, Fresh & processed vegetables, etc.	Dairy products, cereal and cereal preparations and processed fruits and vegetables
Cargo handling capabilities	Details not available	Details not available	Details not available
Transportation facilities	10 weekly services to Mundra port 3 weekly services to JNPT, Nhava Sheva 3 weekly services to Pipavav	182 trailers	Fleet of trailers available
Warehousing facilities	Transit and temperature controlled Warehousing (4000 sq mt)	Details not available	2,100 sq mt capacity being expanded to 4,200 sq mt Bonded area of 500 TEUs ground slots with 2,000 TEUs total capacity
Special facilities (reefer points, temperature controlled warehousing, etc.)	Spacious container yards (165,000 sq mt) Customs clearance with EDI facility Advanced container handling equipment	110 reefer points Temperature-controlled warehousing Spacious container yards (150,000 sq mt) Customs clearance with EDI facility Advanced container handling equipment	Bonded and transit warehouses On-site customs office with EDI facility Reefer points Spacious container yards Advanced container handling equipment

Port connectivity/services		a) 25 services from ICD Garhi-Harsaru, Gurgaon to JNPT (Nhava Sheva), Mumbai every month b) 8 services from ICD Garhi-Harsaru, Gurgaon to Mundra every month c) Daily services between maritime ports d) 10 services to Pipavav every month e) Regular reefer services to Kalamboli f) Double stack services to Mundra and Pipavav	
Hinterland connectivity/Services	Excellent connectivity to NH-1	Details not available	Well connected to the Kundli-Manesar-Palwal Expressway and the Faridabad-Ghaziabad-Noida corridor
Services offered for export cargo	Details not available	Details not available	Details not available
Any other information (business service tie ups, upcoming projects, initiatives in offing, etc.)	Punjab's first private rail-linked logistics park cum Inland Container Depot	-	-

Source: APEDA AgriExchange

4.3. Key Inferences

The Focus States, viz. Punjab, Haryana & Himachal Pradesh, are land-locked territories with minimal access to sea routes. Preferred exit points for transit of export cargo majorly depend upon the nature of cargo (perishability, Bulk/containerized cargo, urgency in demand, etc.) and the operational export routes for the destination markets. Based on aforementioned criteria/requirements, the Focus States have adopted following different exit routes:

1. **Through Airports:**

As discussed, perishable containerized cargo is shipped through air routes. IGI airport at Delhi, supported by a multi-commodity Centre for Perishable Cargo and multiple ICDs (in and around Delhi-NCR region), is the preferred international airport by exporters to export such cargo through air freight. The center is well equipped with state of art infrastructure, however, considering projected increase in export cargo influx there exists a need to evaluate the existing cargo handling capacities at the airport terminal. On-site phyto-sanitary labs and quality inspection laboratories are required to ensure quality of cargo over long haul transits and facilitate smooth & hassle free exports.

Amritsar airport is another International airport catering to this region. However, the airport has limited capacities and infrastructural capabilities to handle agri cargo. There is no Center for Perishable cargo at the airport leading to quality deterioration of perishable produce during transit. Available cargo handling capacities are also limited. The State government is required to augment capacities at Amritsar airport and strengthen the existing infrastructure to cater to probable export influx in the future. Alternatively, the government could also consider creating cargo handling capacities, in line with projected export volumes, at the proposed in international airport at Ludhiana. Ludhiana is geographically more suitable than Amritsar owing to its proximity and connectivity to major production centers in Punjab and Haryana. A Center for Perishable cargo is a must for catering to perishable cargo such as stone fruits, citrus fruits, exotic fruits like Kiwi & strawberries and vegetables.

2. **Through Land routes:**

Exports to Pakistan and Nepal are majorly carried out through road and rail routes. Amritsar-Attari railway station and Land Customs' station at the border facilitate exports to Pakistan. Raxaul, Nautanawa and Jogbani borders/LCS facilitate exports to Nepal. Commodities with extremely low shelf life or specific transit/storage requirements and/or high urgency in demand are usually transported through air freight.

Land route transportation requires adequate access to quality inspection laboratories within state of nearby the transit points. No major port related infrastructure is required; transport happens in trucks, railway coaches or cargo vans. Land Customs' stations are responsible for cargo clearing and document verification.

3. **Inland transportation and storage at ICDs/CFSs:**

Inland Cargo Freight Stations and Inland Container Depots cater to in-transit storage requirements of cargo for areas which are situated at a distance from the sea port and inter/intra state pre shipment transportation is required. Containerization and bulk building also happens at ICDs and CFSs. Considering the geographical location of the Focus states and the distance from the sea ports, ICDs and CFSs form a major connecting link to ports for sea freight.

Major ICDs which cater agricultural cargo are located at Ludhiana, Jalandhar, Amritsar in Punjab and Panipat, Faridabad, Garhiharsaru, Piyala Ballagarh Haryana (PBH) and Rewari in Haryana. There is also a Concor-managed ICD at Ballavgarh Faridabad which attracts agricultural cargo. There are no state accredited ICDs in Himachal Pradesh. Most of the agricultural produce from Himachal Pradesh is directed to either Delhi for exports and domestic trade or to Punjab for further processing. In Punjab, Chheta Amritsar CFS caters to agricultural commodities.

ICDs and CFSs in Punjab are well equipped with adequate storage capacities and infrastructural capabilities to handle existing cargo influx. There is a need to augment existing storage capacities at the above mentioned ICDs in Haryana. Infrastructural capacities at ICD/CFSs in both Punjab and Haryana require evaluation in the light of changing cargo requirements, projected increase in export cargo influx and increase in quantities of perishable cargo.

There is a need to create a CFS at Himachal Pradesh to cater to the local requirements of perishable cargo. Major potential exportable commodities from the state majorly include perishables and high value commodities such as exotic fruits, stone fruits, assorted vegetables and flowers. The proposed CFS will cater to immediate storage and in-transit requirements of the perishable cargo until it reaches Delhi/Amritsar/Chandigarh airports for exports.

4. **Through Sea Ports:**

Only exits available via sea routes are either through ports in Mumbai and Gujrat. Considering the major markets for agricultural commodities exported from these states and the nature of cargo primarily processed, for markets in Middle East & North Africa, EU and Nordic countries, the preferred export routes for perishable cargo are through Nhava Sheva Sea Port and Kandla port. Containerized cargo is mostly transported through Nhava Shewa. Kandla, and Mundra ports. The infrastructural capabilities and cargo handling capacities are evaluated in respective state reports. The export influx from Haryana, Punjab and Himachal Pradesh should also be taken into consideration while presenting port specific recommendations.

5. Initial Basic Feasibility Assessment of the proposed infrastructure

The focus of the study was identifying the infrastructure requirements over 3 states and all possible value chains therefore it was not required to produce a detailed feasibility report for each of the facilities. Such a report will have to be prepared when the specific project is being prepared. However a basic feasibility has been conducted for the facilities proposed in terms of expected through put of the volume of produce. In the assessment we will proceed facility by facility within each of the Focus States.

5.1. PUNJAB

5.1.1. Jalandhar:

One Pack house has been proposed at Jalandhar for post-harvest management and storage of exportable surplus of Potatoes from the state.

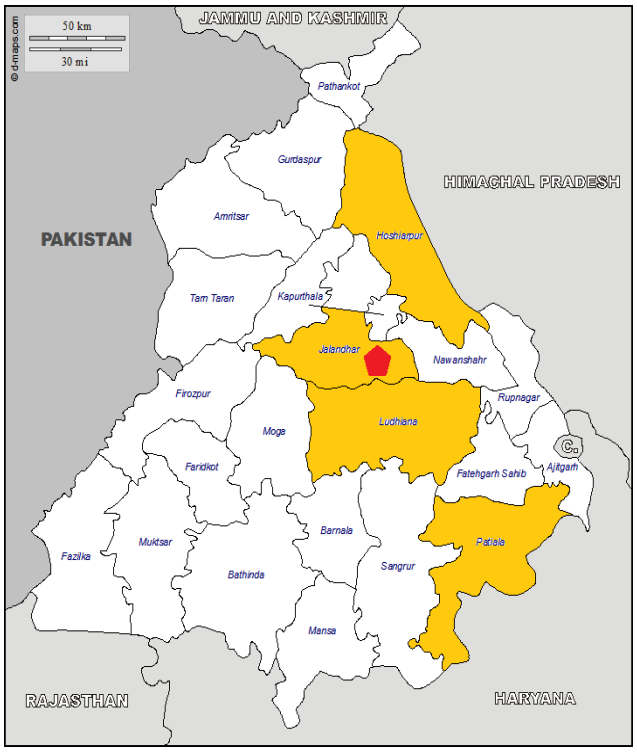


Figure 65: Proposed location for pack house for Potato in Jalandhar

5.1.1.1. Surplus for export

The exportable surplus quantity is calculated to be 68 MT/day. The incremental surplus volumes available for export are calculated as 8194 MT. The average seasonality of Potato is 120 days a year, therefore per day surplus comes out to be 68 MT/day.

5.1.1.2. Capacity utilization

The installed capacity/day of a pack house is 60 MT, therefore one pack house will suffice the surplus, and its capacity utilization comes out to be slightly more than 100% - the said facility will be fully utilized to its potential.

5.1.1.3. Mode of Placement

The pack house can be established by a private player/individual agri-preneur, utilizing some financial support from government; if required, through various agri-infrastructure creation/promotion schemes. Public-Private Partnership can also be explored as an alternative operational model for better market access & managerial competence.

	January	February	March	April	May	June	July	August	September	October	November	December
Potato												

Figure 66: Harvesting window for Potato in Punjab

5.1.1.4. Location

The location of this proposed packhouse considers factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and is not solely based on proximity to major production centers in the state and availability of existing packhouses within the region.

Potato for export from Jalandhar can be transported through various ports depending on the export location. **Approximate distance of Jalandhar from:** Ludhiana ICD is 70 km (1 h 26 min), Amritsar ICD is 80.8 km (1 h 37 min), and Amritsar – Attari border is 114.0 km (2 h 9 min). Jalandhar also has an Inland Container Depot (ICD) to facilitate export related logistics & transportation.

5.1.1.5. Competition/ Existing Facilities

Currently there is 1 APEDA approved pack house at Shahkot in Jalandhar for post-harvest processing & storage of fruits & vegetables; therefore there is no need for a new packhouse facility to be established in Jalandhar.

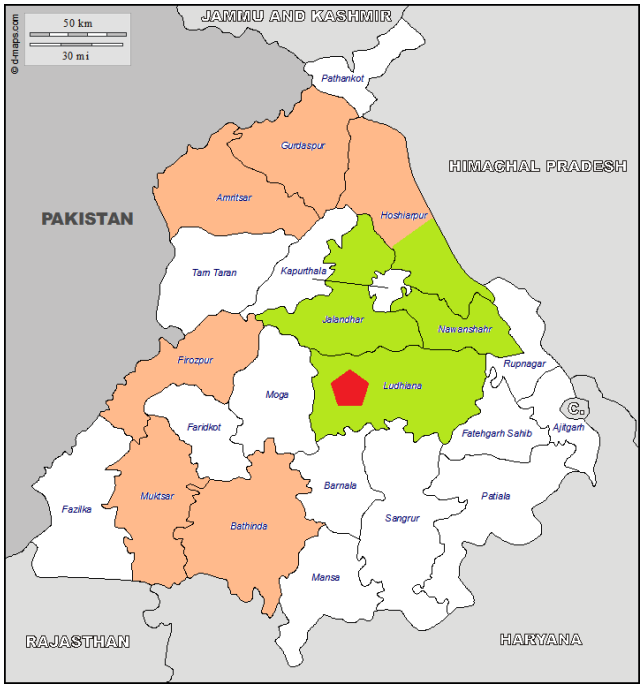


Figure 67: Proposed location for pack house for various Fruits & Vegetables in Ludhiana (Orange: Fruits; Green: Vegetables)

5.1.2. Ludhiana:

One Pack house has been proposed at Ludhiana for post-harvest management and storage of the exportable surplus for Citrus Fruits, Stone fruits, Peas, garlic and assorted vegetables from the state.

5.1.2.1. Surplus for export

The exportable surplus quantity is calculated to be 284 MT/day. The total incremental surplus volumes available for export of all the said fruits and vegetables are calculated as 28639 MT. The average seasonality of all these crops taken together comes to around 180 days a year, therefore per day surplus comes out to be 160 MT/day.

5.1.2.2. Capacity utilization

The installed capacity/day of a pack house is 60 MT, therefore one pack house will suffice the surplus, and its capacity utilization comes out to be more than 100% - the said facility will be fully utilized to its potential.

5.1.2.3. Mode of Placement

The pack house can be established by a private player/individual agri-preneur, utilizing some financial support from government; if required, through various agri-infrastructure creation/promotion schemes. Public-Private Partnership can also be explored as an alternative operational model for better market access & managerial competence.

Fruits & Vegetables	January	February	March	April	May	June	July	August	September	October	November	December
Citrus Fruits (Mandarins												
Stone Fruits (Peaches & Plums)												
Peas												
Assorted Vegetables												
Garlic												

Figure 68: Seasonality distribution of various fruits & vegetables in Punjab (Green: Peak season for the crop; Shaded Area: Peak Utilization Season for the unit)

5.1.2.4. Location

The location of the proposed packhouse considers factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and is not solely based on proximity to major production centers in the state and availability of existing packhouses within the region.

In case of perishable commodities like fruits & vegetables, distance of the export processing center is the most crucial factor in determining the location for such a facility – Lesser the distance between the two points, earlier the product gets into ambient storage & transportation chain and more preferred and convenient is the facility for the exporters, leading to adequate utilization of the said facility.

Various fruits & vegetables for export from Ludhiana & adjoining production centers (viz. Hoshiarpur & Patiala) can be transported to various ports depending on the export location. **Approximate distance of Ludhiana from:** Amritsar airport is 155.6 km (2 h 50 min), Delhi IGI Airport is 325 km (5 h 23 min), Amritsar –Attari Railway station is 176 km (3 h) for export markets in Pakistan and farther Middle East exported via Lahore route. Ludhiana also has an Inland Container Depot to facilitate export related logistics & transportation.

5.1.2.5. Competition/ Existing Facilities

Currently there is 1 APEDA approved pack house at Mushkabad in Ludhiana that caters to post-harvest management & storage of fruits & vegetables; therefore, there is no need for a new packhouse facility for fruits & vegetables to be established in Ludhiana.

5.1.3. Firozepur:

Considering the limitations for export of low shelf life products to long-haul target markets/demand centers and the increasing demand for processed fruits/vegetables, one multi-juice & pulping unit has been proposed at Firozepur to support the export demand for processed (juices/pulps) fruits & vegetables (viz. Citrus Fruits, Stone fruits & assorted vegetables) from the state.

5.1.3.1. Surplus for export

The exportable surplus quantity is calculated to be 199 MT/day. The total incremental surplus volumes available for export for all the said fruits and vegetables are calculated as 27876 MT. The average seasonality of

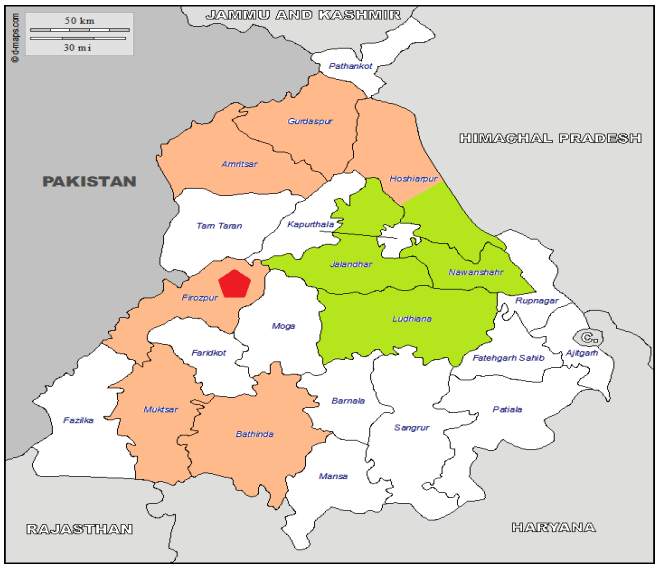


Figure 69: Proposed location for multi –juice & pulp unit for various Fruits & Vegetables in Firozepur (Orange: Fruits; Green: Vegetables)

all these crops taken together comes to around 140 days a year, therefore per day surplus comes out to be 199 MT/day.

5.1.3.2. Capacity utilization

The standard capacity of a small multi-juice & pulp unit is 25 MT/day, therefore one such unit will suffice the surplus, and its capacity utilization comes out to be more than 100% - the said facility will be fully utilized to its potential.

5.1.3.3. Mode of Placement

The multi-juice & pulping unit is recommended to be in a Public-Private Partnership mode for better financial/fund management and for better market access & managerial competence.

Fruits & Vegetables	January	February	March	April	May	June	July	August	September	October	November	December
Citrus Fruits (Mandarins)												
Stone Fruits (Peaches & Plums)												
Assorted Vegetables												

Figure 70: Seasonality distribution of various fruits & vegetables in Punjab (Green represents Peak season for the crop; Shaded Area represents Peak utilization season for the unit)

5.1.3.4. Location

The location of the proposed facility considers factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on proximity to major production centers in the state and availability of existing packhouses within the region.

Exports from Firozepur can be transported through various ports depending on the export location. **Approximate distance of Firozepur from:** Amritsar ICD is 121 km (2 h 19 min), Jalandhar ICD is 124 km (2 h 20 min), Ludhiana ICD is 134 km (2 h 35 min), and Amritsar – Attari border is 138 km (3 h).

5.1.3.5. Competition/ Existing Facilities

Currently a number of pulping & juicing units exist in the state; however, considering the available surplus volumes of various processable fruits & vegetables, we have proposed capacity enhancement of 25 MT/day in the any one of the existing facilities.

5.2. HIMACHAL PRADESH

5.2.1. Mandi:

5.2.1.1. Packhouse at Mandi:

One Pack house has been proposed at Mandi for post-harvest management and storage of the exportable surplus for citrus fruits, stone fruits (Peach & Plum), and other assorted fruits & vegetables from the state. Considering the commonalities in terms of post-harvest infrastructure requirement at a packhouse for given products, in order

to achieve viable capacity utilization levels, we have recommended a shared packhouse for these fruits & vegetables.

5.2.1.1.1. Surplus for export

The exportable surplus quantity is calculated to be 87 MT/day. The incremental surplus volumes available for export are calculated as 11275.5 MT. The average seasonality of all the aforementioned crops comes to 130 days a year, therefore per day surplus comes out to be 87 MT/day.

Fruits/Nuts & Vegetables	January	February	March	April	May	June	July	August	September	October	November	December
Peas												
Assorted Vegetables												
Stone Fruits (Peaches & Plums)												
KiwiFruit												
Strawberry												
Citrus Fruits												
Walnuts												

Figure 71: Seasonality distribution of various fruits & vegetables in Himachal Pradesh (Green represents Peak season for the crop; Shaded Area represents Peak utilization season for the unit)

5.2.1.1.2. Capacity utilization

The installed capacity/day of a pack house is 60 MT, therefore one pack house will adequately suffice the surplus, and its capacity utilization comes out to be more than 100% - the said facility will be fully utilized to its potential.

5.2.1.1.3. Mode of Placement

The pack house can be established by a private player/individual agri-preneur, utilizing some financial support from government; if required, through various agri-infrastructure creation/promotion schemes. Public-Private Partnership can also be explored as an alternative operational model for better market access & managerial competence.

5.2.1.1.4. Location

The location of the proposed packhouse considers factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on proximity to major production centers in the state and availability of existing packhouses within the region.

In case of perishable commodities like fruits & vegetables, distance of the export processing center is the most crucial factor in determining the location for such a facility – Lesser the distance between the two points, earlier the product gets into ambient storage & transportation chain and more preferred and convenient is the facility for the exporters, leading to adequate utilization of the said facility.

Assorted fruits & vegetables for export from Mandi can be transported through various ports depending on the export location. **Approximate distance of Mandi from:** Ludhiana ICD is 214.5 km (5 h 18 min), Amritsar International Airport is 291 Kms. (6 h 5 min), and Amritsar-Attari border is 288 km (6 h 3 min). We understand that there is limited connectivity between available exit points; therefore, considering this situation, we have recommended a CFS in the state to facilitate export packaging/processing facilities within the state, especially for perishable commodities.

5.2.1.1.5. Competition/Existing Facilities

Currently there are no APEDA approved pack houses at Mandi for fruits & vegetables, other than one for Apples, therefore there will be no competition to this new pack house that is being proposed.

5.2.1.2. Multi Juice & Pulp Unit at Mandi:

Considering the limitations for export of low shelf life products to long-haul target markets/demand centers and the increasing demand for processed fruits/vegetables, two multi-juice & pulping units have been proposed at Mandi to cater to the export of processed (juices/pulps) fruits & vegetables (viz. Citrus Fruits, Stone fruits, Exotic Fruits & assorted vegetables) from the state.

5.2.1.2.1. Surplus for export

The exportable surplus quantity is calculated to be 1078 MT/day. The total incremental surplus volumes available for export for all the said fruits and vegetables are calculated as 142246 MT. The average seasonality of all these crops taken together comes to around 132 days a year, therefore per day surplus comes out to be 1078 MT/day.

5.2.1.2.2. Capacity utilization

The standard capacity of a small multi-juice & pulp unit is 25 MT/day, therefore two such units are required to cater to the exportable surplus, and its capacity utilization comes out to be more than 100% - the said facility will be fully utilized to its potential.

5.2.1.2.3. Mode of Placement

The multi-juice & pulping units are recommended in a Public-Private Partnership mode for better financial/fund management and for better market access & managerial competence.

5.2.1.2.4. Location

The location of the proposed facilities considers factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on proximity to major production centers in the state and availability of such facilities within the region.

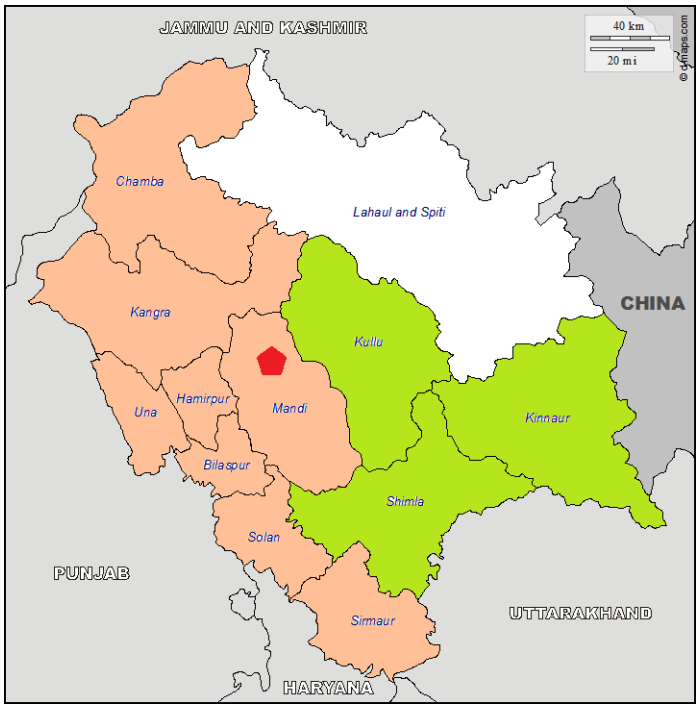


Figure 72: Proposed location for Packhouse & multi-juice & pulp unit for various Fruits & Vegetables in Mandi (Orange: Fruits; Green: Vegetables)

Exports from Mandi can be transported through various ports depending on the export location. **Approximate distance of Mandi from:** Ludhiana ICD is 214.5 km (5 h 18 min), Amritsar-Attari border is 288 km (6 h), and Amritsar International Airport is 291 Kms. (6 h 20 min).

5.2.1.2.5. Competition/Existing Facilities

Currently no APEDA approved multi juice & pulping units exist in the state (though there is a multi-juice packaging unit at Parwanoo in Solan), therefore there will be no direct competition to this proposed additional capacity of multi juice & pulping units.

5.2.2. Kullu:

One Pack house has been proposed at Kullu for post-harvest management and storage of the exportable surplus for Apples from the state.

5.2.2.1. Surplus for export

The exportable surplus quantity is calculated to be 77 MT/day. The incremental surplus volumes available for export are calculated as 9200 MT. The average seasonality of all the aforementioned crops comes to 120 days a year, therefore per day surplus comes out to be 77 MT/day.

Figure 73: Proposed location for Packhouse for Apples in Kullu

Apples	January	February	March	April	May	June	July	August	September	October	November	December

Figure 74: Harvesting window for Apples in Himachal Pradesh

5.2.2.2. Capacity utilization

The installed capacity/day of a pack house is 60 MT, therefore one pack house will adequately suffice the surplus, and its capacity utilization comes out to be more than 100% - the said facility will be fully utilized to its potential.

5.2.2.3. Mode of Placement

The pack house can be established by a private player/individual agri-preneur, utilizing some financial support from government; if required, through various agri-infrastructure creation/promotion schemes. Public-Private Partnership can also be explored as an alternative operational model for better market access & managerial competence.

5.2.2.4. Location

The location of the proposed packhouse considers factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on proximity to major production centers in the state (adjoining production centers include Chamba, Kangra, Mandi, Lahaul Spiti & Kinnaur) and availability of existing packhouses within the region.

Apples for export from Kullu can be transported through various ports depending on the export location. **Approximate distance of Kullu from:** Ludhiana ICD is 282.4 km (6 h 52 min), Amritsar-Attari border is 356 km (7 h 40 min), and Amritsar International Airport is 367.1 km (7 h 51 min).

5.2.2.5. Competition/Existing Facilities

Currently there are no APEDA approved pack houses at Kullu for Apples, however there exists three packhouses for apples in the state – 2 at Mandi & 1 at Shimla. However, considering the incremental export surplus volumes for Apples from the state and the subsequent incremental packhouse infrastructure requirement, we foresee that the new proposed facility will bridge the existing infrastructure requirement gap for post-harvest management & storage for Apples and support the existing packhouse in capacity utilization & load management.

5.2.3. Kinnaur:

One Pack house has been proposed at Kinnaur for post-harvest management and storage of the exportable surplus for Peas and other assorted vegetables from the state. Considering the commonalities in terms of post-harvest infrastructure requirement at a packhouse for given products, in order to achieve viable capacity utilization levels, we have recommended a shared packhouse for these vegetables.

5.2.3.1. Surplus for export

The exportable surplus quantity is calculated to be 13 MT/day. The incremental surplus volumes available for export are calculated as 3023 MT. The average seasonality of all the aforementioned crops comes to 240 days a year, therefore per day surplus comes out to be 13 MT/day.

Fruits & Vegetables	January	February	March	April	May	June	July	August	September	October	November	December
Peas												
Assorted Vegetables												
Citrus Fruits (Mandarins)												
Stone Fruits (Peaches & Plums)												
KiwiFruit												
Strawberry												

Figure 75: Seasonality distribution of various fruits & vegetables in Himachal Pradesh (Green represents Peak season for the crop; Shaded Area represents Peak utilization season for the unit)

5.2.3.2. Capacity utilization

The installed capacity/day of a pack house is 60 MT, therefore one pack house will suffice the surplus, and its capacity utilization comes out to be 22%, if it is assumed that it will be fully utilized to its capacity. Additional exportable volumes of other fruits & vegetables from the region can be diverted to this packhouse to help it achieve optimum utilization levels for increased economic viability and self-sustainability. Some viability gap funding can also be provided initial years until adequate capacity utilization levels are not achieved and the unit does not become sustainable on its own.

5.2.3.3. Mode of Placement

The pack house can be established by a private player/individual agri-preneur, utilizing some financial support from government; if required, through various agri-infrastructure creation/promotion schemes. Public-Private Partnership can also be explored as an alternative operational model for better financial/fund management and for better market access & managerial competence.

5.2.3.4. Location

The location of the proposed packhouse considers factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on proximity to major production centers in the state and the availability of existing packhouses within the region.

In case of perishable commodities like fruits & vegetables, distance of the export processing center is the most crucial factor in determining the location for such a facility – Lesser the distance between the two points, earlier the product gets into ambient storage & transportation chain and more preferred and convenient is the facility for the exporters, leading to adequate utilization of the said facility.

Exports from Kinnaur can be transported through various ports depending on the export location. **Approximate distance of Kinnaur from:** Ludhiana ICD is 419.3 km (8 h 23 min), Delhi IGI Airport is 612.1 km (11 h 25 min), and Amritsar International Airport is 550.7 km (10 h 38 min).

5.2.3.5. Competition/Existing Facilities

Currently there are no APEDA approved pack houses at Kinnaur for vegetables, and therefore there will be no competition to this new proposed pack house.

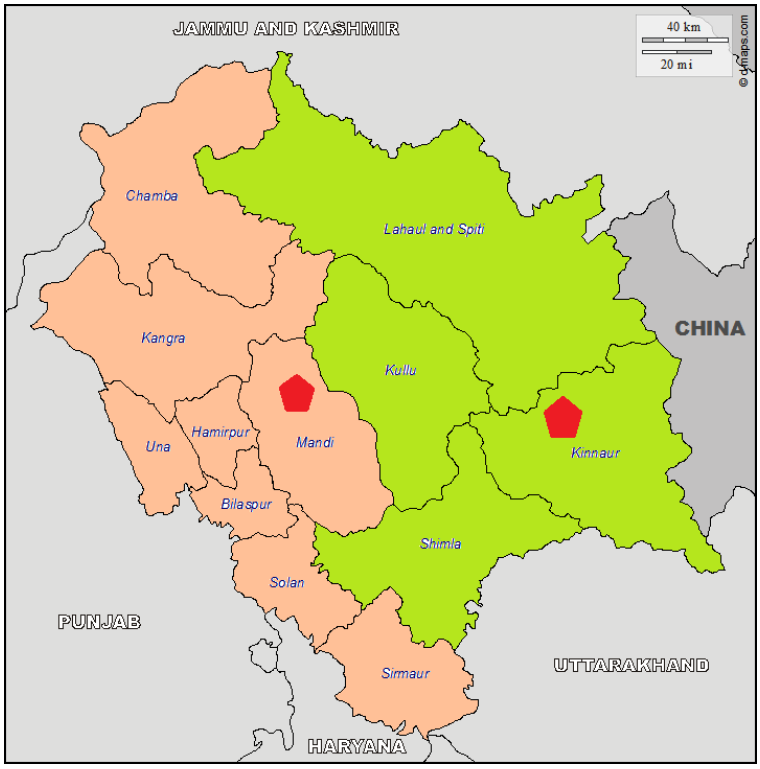


Figure 76: Proposed location for Packhouses for various Fruits & Vegetables in Mandi & Kinnaur (Orange: Fruits; Green: Vegetables)

5.2.4. Kangra:

A specialized integrated pack house with pre-cooling facilities and an automatic grading sorting line has been proposed at Palampur in Kangra Valley for

post-harvest management and processing of flowers & floriculture products for exports from the state. The packhouses will have a pre-cooling chamber and an automated flower grading and sorting line to ensure quality and better remuneration to flower growers.

5.2.4.1. Surplus for export

The exportable surplus quantity is calculated to be 41667 stems/day. The incremental surplus volumes available for export are calculated as 5 Mn stems (50 MT[22]). The average seasonality of floriculture & its products comes to 120 days a year, therefore per day surplus comes out to be 41667 stems/day.

5.2.4.2. Capacity utilization

The capacity of an integrated flower grading/sorting & packing line is 2,16,000 stems/day, therefore one such facility will adequately suffice the surplus, and its capacity utilization comes out to be 19%, if it is assumed that it will be fully utilized to its capacity. Some viability gap funding is required for initial years until adequate capacity utilization levels are achieved and the unit does not become sustainable on its own. However, considering the increasing production trend, the projected growth in exportable surplus from the state, we foresee that the new proposed facility will bridge the existing infrastructure requirement gap for post-harvest management & storage for flowers in the state.

5.2.4.3. Mode of Placement

The facility is recommended in a Public-Private Partnership mode for better financial/fund management and for better market access & managerial competence.

5.2.4.4. Location

The location of the proposed facility considers factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on proximity to major production centers in the state and availability of such facilities within the proximity of major production centers in the region.

In case of perishable commodities like flowers, distance of the export processing center is the most crucial factor in determining the location for such a facility – Lesser the distance between the two points, earlier the product gets into ambient storage & transportation chain and more preferred and convenient is the facility for the exporters, leading to adequate utilization of the said facility.

Flowers for export from Palampur can be transported through various airports depending on the export location and the proximity to major exit points. **Approximate distance of Palampur from:** Amritsar International Airport is 291.5 km (4 h 2 min) and Delhi IGI Airport is 474.8 km (8 h 34 min).

5.2.4.5. Competition/Existing Facilities

Currently there are no such APEDA affiliated/approved flower processing lines in the state, and therefore there will be no competition to this new facility that is being proposed.

[22] **Assumption:** 1 Mn flower stems = 10 MT

5.3. INTER-STATE SHARED INFRASTRUCTURE

5.3.1. IQF (Individually Quick Frozen) Food Products' Unit

In addition to fresh and processed (juices & pulps) agri exports, there also exist substantial opportunity for frozen food & agri exports from the region. Frozen peas are one such significant product category. Therefore, an IQF facility, for peas, potatoes and other such assorted vegetables & fruits (viz. carrots, tomatoes, etc.) is also recommended for the Focus States of Punjab, Haryana & Himachal Pradesh to facilitate exports of value added/frozen food & agri products for low shelf life or temperature sensitive perishable commodities from these states.

5.3.1.1. Surplus for export

The exportable surplus quantity of all perishables which can be frozen is calculated to be 86 MT/day. The incremental surplus volumes available for export are calculated as 17104 MT. The average seasonality of all these perishable agri-produce comes to 200 days a year, therefore per day surplus comes out to be 86 MT/day.

5.3.1.2. Capacity utilization

The capacity of a smallest IQF unit is 40 MT/day, therefore one such unit will adequately suffice the surplus, and its capacity utilization comes out to be more than 100% - the said facility will be fully utilized to its potential.

Fruits & Vegetables for IQF	January	February	March	April	May	June	July	August	September	October	November	December
Peas												
Assorted Vegetables												
Potato												

Figure 77: Seasonality distribution of various fruits & vegetables for IQF from the Focus States (Shaded Area represents Peak utilization season for the unit)

5.3.1.3. Mode of Placement

The IQF facility can be established by a private player/individual agri-preneur, utilizing some financial support from government; if required, through various agri-infrastructure creation/promotion schemes. Public-Private Partnership can also be explored as an alternative operational model for better financial/fund management and for better market access & managerial competence.

5.3.1.4. Location

Location of placement can be mutually agreed upon by the concerned states based on stakeholder requirements and proximity to production clusters within the said states and primary exit points for exports. Other factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and availability of other such units within the region should also be taken into consideration while finalizing the location for such a facility.

5.3.1.5. Competition/Existing Facilities

Currently there are no APEDA affiliated/approved IQF units present in the region, and therefore there will be no direct competition to this new facility that is being proposed. Considering the incremental export surplus volumes for fruits & vegetables from the region & increasing demand for IQF fruits & vegetables, and the subsequent requirement for an IQF unit in the region, we foresee that the new proposed facility will achieve adequate capacity

utilization levels in medium to short term and will bridge the existing infrastructure requirement gap for frozen fruits & vegetables from the Focus States.

5.3.2. Multi Commodity Cold Storage

One multi commodity cold storage has been proposed for Haryana & Himachal Pradesh for in-transit and interim storage of low shelf life or temperature sensitive perishable commodities from these states. The proposed multi commodity cold storage will cater to the gap in existing cold storage capacities and projected incremental volumes of various perishables from these states.

5.3.2.1. Surplus for export

The exportable surplus quantity is calculated to be 281 MT/day. The incremental surplus volumes available for export are calculated as 54617 MT. The average seasonality of all the perishable agri-produce comes to 195 days a year, therefore per day surplus comes out to be 281 MT/day.

5.3.2.2. Capacity utilization

The capacity of a smallest multi-commodity cold storage is 1000 MT/day, therefore one such unit will adequately suffice the surplus, and its capacity utilization comes out to be 28%, if it is assumed that it will be fully utilized to its capacity. Some viability gap funding is required for initial years until adequate capacity utilization levels are not achieved and the unit does not become sustainable on its own.

5.3.2.3. Mode of Placement

The proposed facility must necessarily be under PPP mode to ensure operational efficiency and for better market access & managerial competence.

5.3.2.4. Location

Location of placement can be mutually agreed upon by the concerned states based on stakeholder requirements and proximity to production clusters within the said states and primary exit points for exports. Other factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and availability of other such units within the region should also be taken into consideration while finalizing the location for such a facility.

5.3.2.5. Competition/Existing Facilities

Currently there are two Controlled Atmosphere units for apples at Mandi but no APEDA affiliated/approved cold storage units are present in either Himachal Pradesh or Haryana, and therefore there will be no direct competition to this new facility that is being proposed.

Considering the incremental export surplus volumes for fruits & vegetables from the region and the subsequent incremental requirement for a multi commodity cold storage unit in the region, we foresee that the new proposed facility will bridge the existing infrastructure requirement gap for in-transit and interim storage for perishable exports at least from the Focus States.

5.3.3. Center for Perishable Cargo (CPC)

One CPC has been recommended for Punjab, Haryana & Himachal Pradesh for catering to perishable cargo such as stone fruits, citrus fruits, exotic fruits like Kiwi & strawberries and vegetables from these states. This CPC will cater to the gap in existing in-transit and interim storage of perishable cargo at airports during exit.

5.3.3.1. Surplus for export

The exportable surplus quantity of all perishables which utilize CPC facilities is calculated to be 281 MT/day. The incremental surplus volumes available for export are calculated as 54617 MT. The average seasonality of all these perishable agri-produce comes to 200 days a year, therefore per day surplus comes out to be 195 MT/day.

5.3.3.2. Capacity utilization

The capacity of an optimal economically viable CPC facility is 6000 MT of perishable air cargo/day, therefore one such unit will suffice the surplus, however its capacity utilization comes out to be low (5%), if it is assumed that it will be fully utilized to its capacity.

5.3.3.3. Mode of Placement

The CPC should necessarily be operated in a PPP mode for better financial/fund management and for improved market access & managerial competence.

5.3.3.4. Location

Location of placement can be mutually agreed upon by the concerned states based on stakeholder requirements and proximity to production clusters within the said states and connectivity to target export markets for the given agri exports from the Focus States.

Factors such as hinterland connectivity/road connectivity, proximity to major production centers in the state and availability of existing units within the region also needs to be considered while finalizing the location of placement of this facility.

5.3.3.5. Competition/Existing Facilities

Considering the existing capacities and infrastructural capabilities at various international airports in the Focus States to handle agri-export cargo and the need for on-site phyto-sanitary labs & quality inspection laboratories to ensure quality of cargo over long haul transits and facilitate smooth & hassle free exports, a functional CPC at an international terminal within the states is a must.

Currently the only CPC within the Focus states; the CPC at Amritsar airport, is not operational. Therefore, considering the investment requirement and cost intensive nature of a CPC establishment project, we suggest that reviving operations at Amritsar CPC with proper connectivity to major export destinations should be considered first rather than establishing a new facility.

Alternatively, Chandigarh airport can also be considered for a CPC facility owing to its central location to all three Focus States. Discussions with airport management also reveal that feasibility of establishing such a facility at the Chandigarh Airport is already being considered.

5.4. Revised Cost Estimates:

The study findings were further rationalised with inputs from stakeholders to propose the following revised estimate of costs for the proposed facilities:

Sr.No	Allocated States	Proposed Infrastructure	Placement Location	Capacity of the proposed infrastructure	Estimated cost (in lakh)	Number of Units	Total cost in Lakh Rs
1	Himachal Pradesh	Pack House	Mandi, Kinnaur & Kullu	60 MT#	700	3	2100
		Multi Juice and Pulp Unit	Mandi (Gumma)	25 MT/day	100#	2	200
		Flower Grading sorting packing line*	Palampur	9000 stems /Hour	910	1	910
		Container Freight Station (CFS)	-	-	5000	1	5000
		TOTAL					**8210**
2	Punjab	Multi Juice and Pulp Unit##	Firozepur	25 MT/day	100	1	100
		Center for Perishable Cargo (CPC)	Amritsar/ Chandigarh	6000 MT/annum	710	1	710
		Malting Unit	SAS Nagar	400 MT/day	-	-	Optional
		TOTAL					**810**
3.	Haryana	IQF facility	Panchkula	40 MT/day	1800	1	1800
		Multi commodity cold store	Ambala	1000 MT	120	1	120
		TOTAL					**1920**
Total							**10,940**

#Installed capacity/day

Capacity enhancement of existing lines

*The existing CPC at Amritsar Airport will be utilized with cargo flights operational and catering to major export destinations. If operations at Amritsar Airport are not retrieved, the proposed CPC can be located at Chandigarh airport.

**The capacity of each 40 ft. reefer container is 472320 eggs (Assuming average weight of an egg, including shell, is 0.73 Kg)

6. Summary of Findings

In order to improve exports of agri commodities there are interventions needed across the value chain. These interventions, though not all of them come in the purview of APEDA, are as important as infrastructure. We have discussed some of them in the following section:

1. **Production Specific** –
   Access to quality raw material & good planting material – It is understood that planting material is not under the purview of APEDA, however good agricultural produce starts with good planting material and at least APEDA should sensitize the concerned departments of the following –
   a. Firstly the need to develop crop variations that have internationally acceptable characters such as taste, appearance, size etc. Most of these crops could be exotic crops where Indian research agencies are not focused e.g. planting material is the biggest concerns for the floriculture industry, apple exporters, exotic fruits' sector, etc. So if better and international market focused seed research is done, that will help in the long term

   b. Secondly introduction of new varieties – APEDA can in consultation with exporters identify new seed variants for each major export commodity for development

   Effective pest and disease management at farm level, especially for high value crops like apples, strawberry, Kiwifruit, Citrus fruits, etc., is also quintessential to manage productivity levels to meet export market requirements

2. **Training and Capacity building of Farmers**– Farmer certification is a major bottle neck which often prevents development of new markets, there is need for organizing GAP certifications of farmers for long term sustainability of exports.

   The major Focus Crops from the region comprise of orchard grown high value crops such as apples, stone fruits, Kiwifruit, etc. Training in orchard management and maintenance can help farmers adhere to quality requirements right from the production stage and thus, will ensure better remuneration for the produce.

3. **Traceability** –Traceability of produce has multiple benefits –

   a. Increasingly this is becoming a requirement in the international market even for processed goods

   b. In case of a contagion it is easier to trace the source and control the spread

   c. Even when it is not essential there exists premium for traceable products in some markets

4. **Product development** – processed food products like multigrain breakfast mixes / cake mixes, health drinks, etc. need developmental push i.e. APEDA needs to push for the development and creation of new products – one of the most successful methods for promoting innovation is through the development of Incubation centers for new product development.

5. **Phyto – Sanitary** – Certifications are critical requirements for exporters and often become bottle – neck. Having a large number of testing facilities may not be feasible due to the high cost (INR 250 million) for such a facility; however sample collection and certificate issuance process may be simplified.

6. **Market development –** development of adequate international market linkages will drive exporters' confidence and boost export volumes. Assured international markets/buyers can also help exporters to

ensure that the product confirms to the market/customer specific requirements from very early stages – in some cases right from the production orchards/farms and help save costs later.

Existing Infrastructure and proposed infrastructure

The summary of the infrastructure required for each state is given as the summary of infrastructure requirement both at post-harvest and at exit points at the end of each of the respective sections.

Himachal Pradesh –Investment required in Himachal Pradesh is INR 82.10 crores for 3 packhouses and two multi juice and pulp units (capacity enhancement of existing lines), a flower grading and sorting line, and 1 Container Freight Station (CFS). In addition to post harvest infrastructure, 1 CFS (area = 50 acres) is also recommended for facilitating smooth exports of perishable cargo from the state. The exact location of CFS in the state can be decided depending on product movement, proximity to production hubs, ease of transportation and availability of suitable land. Viability of this CFS needs to be evaluated. The pulping unit and CFS must necessarily be in PPP mode to ensure operating efficiency, while the other facilities can be in any structure.

Punjab – Investment required in Punjab is INR 8.10 crore for 1 multi juice and pulping unit (capacity enhancement of existing lines) at Firozepur a Malting Unit at SAS Nagar for processing of Barley, Pearl Millets and other cereal crops from the state, and a CPC at Amritsar/Chandigarh.

The multi-juice & pulping unit is recommended to be in a Public-Private Partnership (PPP) mode for better financial/fund management and for better market access & managerial competence. An investment of INR 27 crores is required for the proposed Malting unit. The requirement needs to be further evaluated for operational viability considering the available volumes and industry requirements. The malting unit can also be used in sharing with Haryana to achieve maximum capacity utilisation. The Malting Unit is recommended to be in a PPP mode to achieve higher operational efficiency.

For the CPC unit, primary emphasis is to revise operations at existing CPC unit at Amritsar airport with proper connectivity to international export markets. Alternatively, Chandigarh airport can also be considered for a CPC facility owing to its central location to all three Focus States. As indicated by the State Officials, a CPC is proposed to be set up at New Chandigarh airport in Mohali with operational flight connectivity to Dubai & London – two major agri export destinations for India. Therefore, it is recommended that this CPC, once operational, must be utilized by the Focus States to support export of perishable agri commodities/products.

Additionally, Chandigarh and adjoining areas can focus on supporting the export demand in the target markets of Dubai & London for products viz. assorted vegetables & fruits, floriculture products and Peas. Products which are not supported by available agro-climatic conditions in the region can be grown in protected cultivation/greenhouses with controlled atmosphere systems. Details of costing and operational modalities are covered in **Annexure 1.5.** This will also give a benefit of extended crop cycles for certain crops, which in turn, will increase exportable surplus and will provide ability to export those crops all year round and hence, will enable exporters to fetch good prices in the international market.

Haryana – Investment required in Haryana is INR 19.20 crore for 1 IQF facility at Panchkula and a multi commodity cold store at Ambala. The state may share the proposed infrastructure with other states until optimal exportable surplus volumes are not achieved. The multi commodity cold storage can be shared with Himachal Pradesh until optimum capacity utilisation levels are achieved. This will cater to the gap in existing cold storage capacities and projected incremental volumes of various perishables from these states. The proposed facility must necessarily be under PPP mode to ensure operational efficiency.

Since, the states are geographically contiguous, some of these proposed infrastructure may be shared with other states based on the availability of production clusters within the Focus States and the common nature of the product in order to achieve operationally viable capacity utilization levels.

3rd Party Logistics: In Northern India, majority of the large third party logistics providers operate for providing logistics and shipping services for export of agricultural produce. J.M. Baxi group of companies, Maerskline and K Line Pvt. Ltd. are the prominent private sector players which provide end to end solutions. Hanjin Shipping and Hamburg Sud India Pvt. Ltd. are other largest International players which also operate in North India. In addition to these, Shipping Corporation of India and Container Corporation of India are the two prominent public sector shipping and logistics players.

The list of existing cold stores, Inland Container Depots, Container Freight Stations have been included in the **Annexure 1.1 and 1.3** , while infrastructure assessment of all airports have been captured in **Annexure 1.3.2**.

Additional infrastructure options –

These options will not necessarily increase exports but are important enablers –

1. **Food Product Incubation center** –As per Ministry of Food Processing Industries' website, there are only 6 approved Mega Food Parks in this agri cluster – three in Punjab, two in Haryana & one in Himachal Pradesh. Out of these sanctioned projects, International Mega Food Park Pvt. Ltd.; Punjab is the only operational Mega Food Park in the three focus states. Himachal Pradesh and Haryana do not have operational Mega Food Parks as on date. Details of sanctioned & operational Food Parks are provided in **Annexure 1.1.6.**

   Considering the current status of operational Mega Food parks/Food Incubation Centers in the Focus States, a 150,000 square feet incubation center is recommended that can support at least 60 start –ups. It will require an investment of more than INR 100 crores. This project necessarily must be developed under PPP. APEDA can get into a multiparty contract with NIFTEM as one of the potential entities and other large private players in food processing industry. Management can be professional/privately hired whereas the control & oversight will lie under a governing board. Project costing of 7.7 crores for a basic BSL -1 10,000 sq. ft. facility and other important Critical Success Factors are detailed in **Annexure 1.6.**

   The Honey industry personnel have expressed concerns regarding access to honey testing laboratories in Northern India. They have requested for a common lab in the region with collection centers in Himachal Pradesh, Haryana, Uttar Pradesh and J&K. In addition to existing honey testing laboratories (total 04 in the Focus States, 02 in Delhi and 01 each in Rajasthan, Uttarakhand & UP), the analytical support services center of the Food Business Incubation Center will provide analytical/ testing & quality assurance services for food products, including Honey. Details of the Incubation Center and the existing honey testing laboratories are given in **Annexure 1.6 and 1.1.4 respectively.**

2. **Protected Cultivation unit**– Based on the requirements of horticulturists, floriculturists, and growers of high value exotic fruits such as Kiwi, strawberries and stone fruits, in order to augment the production levels and instill export growth, we have illustrated an operational model for introduction of export of exotic crops from India. The model is illustrated in **Annexure 1.5**, with indicative cost estimates. The benefit of this arrangement will be in terms of increase in production and productivity levels, increased export volumes without hampering the domestic demand & supply scenario and better quality compliance. These centers can also be used as Model Centers for farmer development and capacity building at the local level. Tie ups with international buyers can also be explored to ensure ready market access.

3. **Complaint Management/Grievance Redressal Portal to manage & curtail unethical export practices** –Quality of Indian exports in international markets has long being questioned. The government & export regulatory bodies have taken several interventions such as setting up of export

inspection laboratories, export oriented units with integrated post-harvest & export infrastructure, schemes & subsidies for infrastructure development (Mega Food parks, Cold Chain Development), etc. However, all these measures are long term policy/development steps. There exists a parallel need to instantaneously register, track and resolve Indian ExIm grievances. Therefore, to address quality issues pertaining to agricultural & food exports from India, we propose an online system for feedback & compliant registration and grievance redressal for malpractices. Mechanism & modalities of implementation & operation are briefed in **Annexure 1.7**. Such a portal will provide the shortest possible, one-stop solution platform for feedback, complaint registration & grievance/complaint redressal/resolution. The statistics collected from the Portal can be used to monitor, track and manage unethical export practices which will, in turn, benefit both Indian agri-traders and government/export regulatory agencies.

4. **Upgradation of Mandis for Basmati Rice in Amritsar –** Basmati rice is a premium export product from our country. However, since rice, wheat and pulses fall under the purview of Essential Commodities Act, 1955; 2011, their exportable surplus will vary based on domestic procurement requirements/government quotas. Also, most of these commodities have long shelf life and therefore, requirement for post-harvest infrastructure is very minimal.

   However, Basmati rice are susceptible to breakage due to improper handling and storage at mandis. There are no dedicated rice handling equipment and most of the handling at mandis is done manually. Breakage affects the quality and price of the produce. Considering the issues and demand from industry players & state officials, we recommend that provision of basic material handling equipment for Basmati rice, especially for export grade Basmati rice, can help reduce post-harvest/grain losses due to handling and transportation and will also enable better price realization by farmers for the produce. A premium grade electronic stacker, used for moving and loading high quality agricultural products, costs around INR 1,60,000 (excluding excise, customs and other installation costs).

Appendix 1 A - Appendices

1.1. State wise status of post-harvest/processing infrastructure available as on date

1.1.1. Existing Pack houses in the Focus States

Table 22: Recognition Pack House list issued by APEDA

S. NO.	Exporter Name	Pack House No., Date of Issue & Date of Expiry
1.	M/s. Patiala Horticulture Pvt. Ltd. Village & P O Lalgarh (Asarpur Chupki Road), Tehsil Samana E-mail – karam_phpl@yahoo.co.in Dist. Patiala – 147 001 Punjab || Tel – 0175-2220082, Mob –9872319939	APEDA/FFV/PH/246/2012-13 Date of issued 11/04/2014 Date of Expiry:10/04/2016 **Product – vegetables**
2.	M/s. Namdhari Seeds Pvt. Ltd. Village Rain, P O Sri Bhaini Sahib Kohara-Machhiwara Road, Dist Ludhiana – 141 126, Punjab Tel – 0161-2834420	APEDA/FFV/PH/245/2012-13 Date of issued 04/04/2014 Date of Expiry:30/04/2016 **Product – vegetables**
3.	M/s. Field Fresh Foods Pvt. Ltd. Village & P O Ladhowal, Dist. Ludhiana – 141008, Punjab Tel – 0161-6548634 Mob - 0816657436	APEDA/FFV/PH/242/2012-13 Date of issued 31/03/2014 Date of Expiry:30/03/2016 **Product – vegetables**

Source: APEDA Website (www.apeda.gov.in/), as accessed in May 2015

1.1.2. State wise information on Warehouses

Table 23: List of the Warehouses Registered with the WDRA (as on 30.4.2015)

(CWC = Central Warehousing Corporation, SWC = State Warehouse Corporation, PCS = Primary Co-perative Society, CS = Cold Storage, Pvt = Private Godown)

Name & Address of Warehouse	Name of Warehouseman & Contact Number	Registration No. & Date	Registration Period	Registered Capacity (in Tons)	Remarks
HARYANA					
Central Warehousing Corporation Fatehabad, Market Committee Godowns, Opp. New Grain Market Near SBI, Fatehabad – 125 050, Haryana.	Shri Subhash Mehta, Mob:- 09416230194	HR/FTD/FTD/0006 Dated: 08.04.11	From 21.04.15 up to 10.03.18	700	
Central Warehousing Corporation Narwana,Jina CW, Narwana,Jind, New Anaj Mandi, Narwana, Distt. Jind – 126 116 Haryana.	Sh. K. C. Nain Tel:- 01684 291687	HR/IN/NRW/0003 Dated: 26.12.2014	From17.12.14 up to 07.10.2017	1000	
CWC , Karnal-III-Karnal , Central Warehouse,, Karnal-III, Bajida Jattan Road, Outside Jundla Gate, Karnal – 132 001	Shri V. K. Singhal Tel:- 0184 2002416	HR/KUN/KUN-II/00010 Dated: 24.12.2014	From 18.12.14 up to 07.10.2017	5000	

Central Warehousing Corporation Sirsa Road, Hissar, PIN- 125001, Haryna	Sh. Vijay Kumar	HR/HSR/HSR/00012 Dated: 08.04.11	From 21.04.15 up to 10.03.18	5000	
Central Warehousing Corporation Naraingarh, Near Govt. College, Kullarpur Road, Naraingarh - 134203	Shri Rakesh Kuarm Srivastava Tel:- 01734 284070	HR/UMB/NA/00014 Dated: 08.04.11	From21.03.11 up to 20.03.14	970	
Central Warehousing Corporation Karnal-I, Near Grain Market, Matak Mazari, Karnal 132001	Sh. S. K. Singhal Tel:- 0184 2272664	HR/KUN/KUN-I/00008 Dated: 24.12.2014	From 16.12.2014 up to 07.10.2017	1500	
Central Warehousing Corporation Assandh Compartment No. 1 A, Sirsa Road, Assandh, Karnal, Pin No. 132039 (Haryana)	Shri Rajendra Kumar Tel:- 01749 278332	HR/KUN/ASS/00010 dated 08.12.2014	From05.12.2014 up to 19.08.2017	1944	
Central Warehousing Corporation Ganauar (Sonepet), No. 1 CWC, Railway Road, Village/Taluka – Ganauar, Distt.- Sonepet, Pin No. 131101 (Haryana)	Sh. Ved Prakash Mob:- 8059097576	HR/SNP/GNU/00018 Dated: 26.12.2014	From17.12.2014 up to 07.10.2017	1575	
Central Warehousing Corporation Sonepat, Near Kalupur Octroi, Old Rohtak Road, Village/Taluka – Sonepat, Distt.- Sonepat, Pin No. 131101 (Haryana)	Shri Jai Bhagwan Uttam Tel:- 0130 2212364	HR/SNP/SNP/00012 Dated: 26.12.2014	From17.12.2014 up to 07.10.2017	1250	
Central Warehousing Corporation Karnal –II, Pingli Road, Village/Taluka – Karnal, Distt.- Karnal, Pin No. 132001 (Haryana)	Shri Rajender Singh, Tel:- 0184 2290379	HR/KUN/KUN II/0009 Dated: 24.12.2014	From 16.12.2014 up to 07.10.2017	2473	

Central Warehousing Corporation Charkhi Dadri, Compartment No. 1C, Near Bus Stand, Loharu Road, Vill./Taluka – Charkhi Dadri, Distt.- Bhiani, Pin No. 127306 (Haryana)	Shri Veer Bhan Yadav Tel:- 01250 220156	HR/BNW/CKD/00001 Dated: 24.12.2014	From 16.12.2014 up to 07.10.2017	1250	
Central Warehousing Corporation Indri-Karnal, Near Anaj Mandi, Village/Taluka – Karnal, Distt.- Karnal, Pin No. 132041 (Haryana)	Shri Suresh Pal Tel:- 0184 2382284	HR/KUN/IND/00019 Dated: 26.12.2014	From 17.12.2014 up to 19.08.2017	3400	
NCMSL Sandeep chaudhary ARDC Godown & Ramesh Saini Godown, Opp. – Hafed Godowns, Jind-Road, Kaithal, Vill - Patti Chaudhary. , Kaithal, Haryana	Sh. Anil Kumar Mob: 09315101593	HR/KT/00123 Date 18.08.2011	From 31.05.11 up to 30.05.14	10000	
NCMSL CMP MPR Properties Pvt. Ltd. , Near Delhi Pul Hisar Road, Sirsa, Haryana	Sh. Vinod Sharma Mob: 09315101591	HR/SI/00124 Date 18.08.2011	From 31.05.11 up to 30.05.14	10000	
HIMACHAL PRADESH					
Central Warehousing Corporation Solan, Vill. Kather, P.O. Chambaghat, Solan – 173213	Sh. Anil Kumar Sood Tel:- 01792 230406	HP/sol/00040 Dated: 23.04.2011	From 11.03.11 up to 10.03.14	3000	
Central Warehousing Corporation MA-Adampur, Mandi Adampur, Distt. Hissar - 125052	Sh. Jai Prakash Tel:- 01669 242025	HR/HSR/ADR/00005 Dated: 08.04.11	From 21.04.15 up to 10.03.18	500	

PUNJAB					
Central Warehousing Corporation, Hoshiarpur, Focal Point – 4, Phagwara Road, Hoshiarpur PIN – 146001, Punjab	Sh. Parveen Kumar Tel:- 01882 248347	PB/HO/00088 Date 28.07.11	From 22.07.11 up to 21.07.14	1700	
Central Warehousing Corporation, Abohar - I, Kirpa Ram Marg, Abohar, PIN - 151116	Sh.Ram Prasad Tel:-01634 220231	PB/FI/000102 Date 29.07.2011	From 20.04.11 up to 19.04.14	2000	
Central Warehousing Corporation, Abohar-II, Fazilka Road (Complex), Near Phagwara Factory, Abhor – 152 116, Punjab	S. Tara Rani Tel:- 01634 220031	PB/FI/000103 Date 30.07.2011	From:_ 20.04.11 up to 19.04.14	1613	
Punjab State Warehousing Corporation,Nawanshar, Dana Mandi (Garin Market) Complex, Kariam Road, Nawanshar - 144 526, Punjab	Sh.Nirmal Singh Tel: 01823 222431	PB/BS/00247 Dated: - 08.06.12	From 01.05.12 up to 30.04.15	1800	
, Punjab State Warehousing Corporation, Sultanpur Lodhi, Village: Dalla, Dist.: Kapurthala, PIN – 144626, Punjab	Sh. Paramjit Singh Tel: 09855833910	PB/KP/00248 Dated: - 09.07.12	From:_ 01.05.12 up to 30.04.15	2700	
Punjab State Warehousing Corporation Shahkot, Mainwal Road, Opp. ITI Shahkot, Vill.: Mainwal, Dist.: Jalandhar-	Sh. Mandeep Singh Tel: 0172 2703014	PB/JL/00249 Dated: - 09.07.12	From:_ 01.05.12 up to 30.04.15		

Punjab State Warehousing Corporation Nakodar, Nurmahal Road, Vill.: Nakodar, Dist.: Jalandhar 144005 Punjab.	Sh. Harjit Singh	PB/JL/00250 Dated: - 09.07.12	From 01.05.12 up to 30.04.15	2250	
Punjab State Warehousing Corporation,Wajidowal, Pagwara, Distt. Kapurthala, - 144 601, Punjab	Sh.Gurdeep Singh Tel: 9501007098	PB/JL/00251 Dated: - 09.07.12	From 01.05.12 up to 30.04.15	2250	
Punjab State Warehousing Corporation, Peer Choudhary Complex Dist.: Kapurthala – 144601 Punjab.	Sh. Nikhil Pujara Tel: 01822 232675	PB/KP/00252 Dated: - 09.07.12	From 01.05.12 up to 30.04.15	2700	
Punjab State Warehousing Corporation,Dhogri Road, Nurpur, Distt. Jalandhar – 144 001,Punjab	Shri Rajiv Kumar Tel: 0181 2610619	PB/JL/00253 Dated: - 09.07.12	From 01.05.12 up to 30.04.15	2250	
Punjab State Warehousing Corporation, Bolath Road, Kartarpur, Near Kalyan Rice Mill Dist.: pJalandhar - 144801 Punjab	Sh. Pawan Kumar Tel: 09501359500	PB/JL/00254 Dated: - 09.07.12	From 01.05.12 up to 30.04.15	1500	
Central Warehousing Corporation, Pathankot, (Base Depot), Chakki Bank, Village/Taluka Pathankot, Dist. Pathankot, Pin – 145001 Punjab	Shri Sunil Kumar Verma Tel:- 0186 2224174	WDRA/2014/T-I/WH/21- 17-01/543 Dated: - 23.12.14	From 19.12.2014 to 26.03.2017	10000	
Central Warehousing Corporation, Amritsar (BD), New Grain Market, Out Side Gate Bhagtanwala, Amritsar, 143001 Punjab	Sh. Gurmail Chand. Tel:- 0183 2522272	PB/AM/00277 Dated: - 26.11.12	From 31.08.12 up to 30.08.15	20000	

Source: WDRA Website (www.**wdra**.nic.in/), as accessed in May 2015

1.1.3. Status of Existing Cold Storage Units across Focus States

Table 24: Selected State-wise Status of Cold Storage Capacity in India (As on 04.05.2012)

Selected State-wise Status of Cold Storage Capacity in India			
(As on 04.05.2012)			
			(In ' 000 MT)
States	**Cold Storage Requirement**	**Present Capacity**	**Gap**
Andhra Pradesh	2324	901	1423
Assam	919	88	831
Bihar	4241	1147	3094
Chhattisgarh	543	342	201
Gujarat	2748	1267	1481
Haryana	804	393	411
Himachal Pradesh	487	20	467
Jammu and Kashmir	737	43	694
Jharkhand	796	170	626
Karnataka	2404	407	1997
Kerala	2771	58	2713
Maharashtra	6273	547	5726
Manipur	80	0	80
Meghalaya	239	3	236
Mizoram	74	0	74
Madhya Pradesh	1213	808	405
Nagaland	70	6	64
Odisha	1835	291	1544
Punjab	1318	1345	-27

Rajasthan	391	324	67
Tamil Nadu	7906	239	7667
Tripura	163	30	133
Uttar Pradesh and Uttarakhand	12228	10187	2041
West Bengal	10566	5682	4884
India	**61130**	**24298**	**36832**

Source: Rajya Sabha Unstarred Question No. 3172, dated on 04.05.2012.

Table 25: State-wise Number of Cold Storages in India (As on 31.3.2014)

State-wise Number of Cold Storages in India (As on 31.3.2014)	
States/UTs	**Number of Cold Storages**
Andaman and Nicobar Islands	2
Andhra Pradesh	404
Arunachal Pradesh	2
Assam	34
Bihar	303
Chandigarh	6
Chhattisgarh	89
Delhi	97
Goa	29
Gujarat	560
Haryana	295

Himachal Pradesh	30
Jammu and Kashmir	28
Jharkhand	55
Karnataka	189
Kerala	197
Lakshadweep	1
Madhya Pradesh	260
Maharashtra	540
Manipur	1
Meghalaya	4
Mizoram	3
Nagaland	2
Odisha	111
Puducherry	3
Punjab	606
Rajasthan	154
Sikkim	2
Tamil Nadu	163
Tripura	13
Uttar Pradesh	2176
Uttarakhand	28
West Bengal	502
India	**6889**

Source: Lok Sabha Unstarred Question No. 420 , dated on 25.11.2014

1.1.4. State wise information on Export Quality Testing Labs

Table 26: List of Approved External Laboratories

S. No.	State	Name of Laboratory	Date of Approval	Validity Up To
1.	Gurgaon	M/s Intertek India Pvt. Ltd.	13/03/2015	12/03/2017
2.	Gurgaon	Reliable Analytical Laboratories Private Limited, Bhiwandi	13/02/2015	12/02/2015
3.	Punjab	M/s Punjab Biotechnology Incubator, Amritsar	25/02/2015	24/02/2017

Source: Export Inspection Council of India, 2014-15

Table 27: List of Approved Honey Testing Laboratories (as approved by Export Inspection Council of India)

Approval No	Unit Name	Unit Address	Unit City	Unit State	Scope Of Approval	Date Of Approval	Date Of Expiry
Honey-04-002	Little Bee Impex,	G.T.Road, Doraha	Ludhiana	Punjab	Honey (Establishment for all countries including EU)	06/02/2015	09/02/2016
Honey-04-006	M/s Kejriwall Bee Care India Pvt. Ltd.	Vill. Jalalpur, P.O.Banur Rajpura, Distt. Patiala, Punjab-140601, India	Patiala	Punjab	Honey (Establishment for all countries including EU)	28/11/2014	27/11/2015

Approval No	Unit Name	Unit Address	Unit City	Unit State	Scope Of Approval	Date Of Approval	Date Of Expiry
Honey-04-012	M/s Hi-Tech Natural Products (India) Ltd.	205, jawahar Gali, Farsh Bazar, Shahadara	Delhi	Delhi	Honey (Establishment for all countries other than EU)	01/06/2015	31/05/2016
Honey-04-013	M/s Shakti Apifoods Private Limited.	Malerkotla- Ludhiana Road, Vill. Bhogiwal,Â Distt Sangrur	Ludhiana	Punjab	Honey (Establishment for all countries other than EU)	09/10/2014	08/10/2015
Honey-04-014	M/s Brij Health Care	Village Tehra Lodha, NH-11, Agra Highway	Bharatpur	Rajasthan	Honey	08/03/2015	07/03/2016
Honey-04-015	M/s Apis India Limited	Khasra no.66-69, Village Makhiali,Dundi Peerpura Road, Distt-Haridwar	Roorkee	Uttarakhand	Honey	01/08/2015	31/07/2016
Honey-04-017	M/s Allied Natural Products	Rathdana Road,Liwaspur Industrial Area,Bahalgarh,Distt.Sonepat (Haryana)	Sonepat	Haryana	Honey	07/04/2015	06/04/2016
Honey/04//016/2014	M/s Ambrosia Natural Products India Pvt Ltd	Village & Post:Kandera, Distt,: Baghpat (U.P) -250620	Baghpat	Uttar Pradesh	Honey	27/10/2014	26/10/2015
Honey/04/018/2015	M/s Ezeebee Overseas (P) Ltd.	Khasra No.661-662,Landmark near Nangli Poona,Village-Qadipur,New Delhi-110036		New Delhi	Honey	21/08/2015	20/11/2015

Source: Export Inspection Council of India, 2014-15

1.1.5. State wise information on Slaughter houses

Table 28: State-wise information on slaughter houses

S. N.	State/ UT	No. of slaughter houses	No. of animals slaughtered/day		
		(as on 1.4.2009)	Small	Large	Total
1	Andhra Pradesh	130	15623	4321	19944
4	Bihar	3			
5	Chhattisgarh	11	236		236
6	Goa	1		150	150
7	Gujarat	39	936	144	1080
8	Haryana	21	445		445
9	Himachal Pradesh	25	318		318
10	Jammu & Kashmir	4	300		300
12	Karnataka	99	4929	679	5608
13	Kerala	47	666	599	1265
14	Madhya Pradesh	25	712	263	975
15	Maharashtra	150	8558	9285	17843
17	Meghalaya	4	105	10	115
18	Mizoram	1	2	3	5
21	Punjab	45	2655	1710	4365
22	Rajasthan	7	2690	100	2790
23	Sikkim	0		12	
24	Tamil Nadu	111	6527	405	6932

26	Uttar Pradesh	126	7641	10519	18160
27	Uttaranchal	10	347	27	374
28	West Bengal	42	2898	332	3230
30	Chandigarh	1	200		200
31	Daman Diu Dadra	2	20	4	24
32	Delhi	1	2000	500	2500
33	Lakshadweep	1		1	1
34	Puducherry	1	70	5	75
	Total	907	57878	29057	86935

Source: FICCI; 2013-14

1.1.6. Details on existing Mega Food Parks in the Focus States

Table 29: List of Project Assisted and operational Case(s) under Mega Food Park Scheme by MoFPI

S. No.	Party	Project Location	District	State	Project Cost (in Rs. crores)	Approval Date	Grant Approved (in Rs. crores)	Grant Released (in Rs. crores)
1	Poliyan Mega Food Park Pvt. Ltd.	Village Singha, Tehsil Haroli	Una	Himachal Pradesh	99.7	06.08.2014	50	-
2	International Mega Food Park Ltd.	Village Dhabwala Kala, Malout-Fazilka Road, Dana Mandi Rd, Arniwala Shakh Subhan	Fazilka	Punjab	130.38	25.05.2011	50	45
3	Haryana state Ind. Dev. Corporation Ltd.	Saha, Distt.- Ambala	Ambala	Haryana	Not Given	Not Available	2.93	2.93
4.	Punjab Agro Industries Corporation Limited (PAIC)	Ladhowal, Ludhiana District	Ludhiana	Punjab	117.61	10.11.2015	50	Not released
5.	M/s Sukhjit Mega Food Park & Infra Ltd.	Village Rehana Jattan, Tehsil Phagwara	Kapurthala	Punjab	128.28	06.11.15	50	SPV is in the process of meeting the conditions for release of 1st tranche of 1st Installment.
6.	Haryana state Ind. Dev. Corporation Ltd.	Rai, Sonipat	Sonipat	Haryana	164.33	06.11.15	50	HSIDC is in the process of meeting the conditions for release of 1st tranche of 1st Installment.

Source: Ministry of Food Processing Industries (Website: http://mofpi.nic.in/mofpiweb/mfp.aspx; as assessed in Feb. 2016)

Out of these sanctioned projects, International Mega Food Park Pvt. Ltd. is the only one operational Mega Food Park in the three focus states. This park is based in Punjab. Himachal Pradesh and Haryana do not have operational Mega Food Parks as on date. Details on ongoing facilities/services available at the International Mega Food Park Pvt. Ltd. are provided below:

- Fully Operational Industrial sheds for lease to SMEs
- Developed Industrial plots for lease to Industry
- 1 MT per hour IQF processing line for vegetables
- 40000 MT of Multi Grain Scientific Silo Storage Systems
- A 4 MW Co-generation unit based on biomass for continuous power for all units in the park
- State-of-the-art Milk Processing Plant - with installed capacity to process 1 Lac litres per day
- 10 MT per hour sorting, grading and waxing facilities for agricultural and horticultural crops
- 2000 MT capacity frozen (-18 degree) cold stores
- 4000 MT Multi Chambers Cold Stores for different horticulture crops
- Dry Warehousing - 6000 MT Storage Capacity
- Steam for processing
- Common Effluent Treatment Plan
- Marketing Consultancy Services

Source: International Mega Food Park Website, http://www.imfpl.com/ , as accessed in May 2015; MoFPI, 2015

1.2. Crop wise Export Potential Analysis Datasheets

1.2.1. Apple

1.2.1.1. World Production & Trade Summary – Apple

(in 1000 MTs)					Dec	
	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Production						
China	31,681	33,263	35,985	38,500	39,680	37,800
European Union	12,096	10,981	12,338	12,207	11,974	13,300
United States	4,280	4,175	4,231	4,049	4,693	4,877
Turkey	2,750	2,500	2,700	2,900	2,900	2,250
India	1,777	2,891	2,203	2,200	2,200	2,200
Russia	1,230	910	1,124	1,264	1,416	1,550
Chile	1,370	1,431	1,360	1,420	1,310	1,410
Brazil	1,279	1,339	1,336	1,335	1,335	1,335
Ukraine	897	954	1,127	1,120	1,120	1,120
South Africa	781	767	813	907	900	910
Other	3,916	4,123	4,056	3,735	4,061	4,081
Total	62,057	63,334	67,273	69,637	71,589	70,833
Fresh Dom. Consumption						
China	24,941	26,520	30,647	32,317	34,920	33,810
European Union	8,146	7,538	8,072	7,929	8,070	8,664
United States	2,269	2,156	2,195	2,293	2,494	2,658
India	1,881	2,988	2,381	2,370	2,364	2,370
Turkey	2,560	2,328	2,517	2,762	2,609	2,112
Russia	1,435	1,533	1,564	1,947	1,944	1,750
Brazil	1,080	1,227	1,112	1,163	1,227	1,245

Other	6,258	6,105	6,376	6,345	6,574	6,364
Total	48,570	50,394	54,863	57,126	60,203	58,974
For Processing						
European Union	3,327	2,973	3,281	3,273	2,950	3,868
China	5,600	5,760	4,400	5,200	3,850	3,150
United States	1,424	1,341	1,368	1,058	1,569	1,534
Argentina	380	500	450	420	250	520
Russia	881	458	721	570	491	515
Chile	343	434	403	392	295	380
South Africa	234	216	215	245	305	295
Other	812	819	870	754	834	831
Total	12,999	12,500	11,708	11,910	10,544	11,092
Imports						
Russia	1,120	1,111	1,201	1,338	1,100	800
European Union	590	620	518	563	623	550
Mexico	215	214	216	266	226	260
Canada	184	191	190	250	223	225
India	130	144	208	197	197	200
United States	182	149	173	195	213	190
United Arab Emirates	167	147	166	223	189	180
Bangladesh	138	163	160	121	148	160
Taiwan	127	149	119	136	161	160
Brazil	77	97	58	94	117	150
Other	1,961	1,765	1,781	1,742	1,623	1,657
Total	4,893	4,750	4,789	5,125	4,820	4,532
Exports						
European Union	1,214	1,090	1,503	1,568	1,576	1,250
China	1,201	1,057	1,012	1,026	934	880
United States	769	827	841	893	843	875
Chile	843	800	762	833	820	834
South Africa	306	335	389	459	380	400

New Zealand	260	300	285	322	310	325
Serbia	70	110	129	40	143	150
Argentina	179	233	131	162	150	145
Brazil	91	49	72	85	45	60
Azerbaijan	84	38	51	58	36	45
Other	335	321	277	193	344	182
Total	5,352	5,160	5,451	5,641	5,581	5,146

Source: US-FDA – FAS, Dec. 2014 Newsletter on Fresh Deciduous Fruit (Apples, Grapes & Pears): World Markets and Trade

Note: The United States and Mexico are on an August-July marketing year. All other Northern Hemisphere countries are on a July-June marketing year. Southern Hemisphere countries are on a calendar year indicated as the second year of the split year.

Table 30: Major Importers of Apples from India (Based on last three year data: 2013, 2012, 2011)

Country	Export Volume Share*
Nepal	88%
Bangladesh	9%
Sri Lanka	1%
Maldives	0.33%
Others	1%

Table 31: Export Potential analysis for Apples from India

Year	India Total Exports	India Exports to major import markets		Avg. Incremental Growth rate	Targeted Growth rate	Volume Target for Focus region	Total Exports - Revised as per target	Incremental Volume	Contribution of HP (in MT)
2013	37165.38	14405.02	39%	4%	43%	52994.76			
2015	26552.52	14640.30	55%			37861.71			
2017	24044	22637.16				34284.76	60578.73	34026.21	10207.86
							54855.62	30811.62	9243.48
							Contribution of HP	30%	

1.2.2. Citrus Fruits

Table 32: Production and Export Projections for Citrus Fruits (total) for next 5 years

	STATE WISE PRODUCTION DATA (in'000 MT)				Production from India (in MT)	Exports from India (in MT)	EXPORTS FROM FOCUS STATES (In '000 MT)	
Years	PN	HR	HP	Total production - Focus states			Exportable Surplus from the focus region (20% of total production)	Estimated Export volumes from focus region (1% of expected exportable surplus)
2008	8608	66.8	24.7	8699.50	8015000	67000	1739.9	17.40
2009	9638	63.164	26.28	9727.44	8623080	56522	1945.4888	19.45
2010	7464	98.33	28.14	7590.47	9638000	19666	1518.094	15.18
2011	7922.1	130	28.7	8080.80	7464000	58948	1616.16	16.16
2012	10089.7	225.05	24.32	10339.07	7922000	53041	2067.814	20.68
2013	9903.54	144.18	66.8	10114.52	10090000	58281	2022.90	20.23
2014	10205.13	156.93	53.67	10415.74	10249164	48642	2083.15	20.83
2015	10372.85	184.58	62.84	10620.28	10709384.27	49516	2124.06	21.24
2016	10583.67	187.87	73.17	10844.71	10898141.71	47160	2168.94	21.69
2017	10885.02	202.26	84.07	11171.34	11161489.84	48153	2234.27	22.34
2018	11287.45	230.52	93.51	11611.48	11481167.78	46973	2322.30	23.22
2019	11993.70	272.95	95.85	12362.50	11892950.9	49834	2472.50	24.73
Expected CAGR (2014 to 2019)					**2.51%**	**0.40%**		**-15%**

Source: Indian Horticulture Database 2013

1.2.3. Exotic Fruits

1.2.3.1. Strawberry

Table 33: Production and export projections for strawberry from the Focus states for next 3 years

	STATEWISE PRODUCTION DATA ('000 MT)					PRODUCTION IN INDIA		Exports - India (HS Code: 081010) (in MT)	EXPORTS FROM FOCUS STATES (in '000 MT)		
	PN	HR	HP	Total production - Focus states	Production in Focus states' - Growth rate	Production-India (in '000 MT)	Production-India (in MT)		Exportable Surplus - focus region (20% of total production)	Estimated Export volumes - focus region (5% of M)	Export Volumes in Focus states - Expected Growth rate
2011	0	0	0.30	0.30		0.30	300.00	0.192	0.06	0.0030	
2012	0	0	0.35	0.35	17%	1.40	1400.00	49.39	0.07	0.0035	**17%**
2013	0	0	0.48	0.48	37%	1.61	1610.00	94.176	0.10	0.0048	**37%**
2014	0	0	0.56	0.56	16%	2.41	2413.33	141.90	0.11	0.0056	**16%**
2015	0	0	0.67	0.67	20%	2.82	2821.11	187.67	0.13	0.0067	**20%**
2016	0	0	0.76	0.76	13%	3.49	3492.59	234.74	0.15	0.0076	**13%**
2017	0	0	0.86	0.86	14%	3.99	3988.27	280.95	0.17	0.0086	**14%**
Expected CAGR					**19.49%**	**-0.03%**	**-30.90%**	**183.26%**		**16%**	

Source: Indian Horticulture Database 2013, www.nhb.gov.in, UNComtrade, Indiastat.com

1.2.3.2. Stone Fruits- Peaches & Plum

Table 34: Production and Export Projections for Stone fruits (Peaches & Plums) for next 3 years

State wise Production data ('000 MT)						India - Production & Exports Data (in MT)				Export Potential from Focus States (in '000 MT)		
Year	PN		HP		Total production - Focus states	Growth rate	Production	Exports	Exports Growth Rate	Exports as % of production	Exportable Surplus - focus region (20% of total production)	Estimated Export volumes - focus region (5% of P)	Estimated Export volumes - focus region (2% of P) (in MT)
	Peach	Plum	Peach	Plum									
2011	27.5	3.4	5.1	9.8	45.80		72300	110		0.15%	9.16	0.46	458.00
2012	29.13	3.61	11.28	12.11	56.13	23%	74120	308	180%	0.42%	11.226	0.56	561.30
2013	30.34	3.86	6.27	15.99	56.46	1%	75800	1349	337%	1.78%	11.29	0.56	564.60
2014	31.83	4.08	8.72	18.82	63.46	12%	77573	120	-91%	0.15%	12.69	0.63	634.57
2015	33.13	4.32	6.20	22.35	66.01	4%	79284	740	516%	0.93%	13.20	0.66	660.09
2016	34.56	4.55	6.99	25.42	71.52	8%	81037	645	-13%	0.80%	14.30	0.72	715.24
2017	35.91	4.79	5.57	28.80	75.06	5%	82762	341	-47%	0.41%	15.01	0.75	750.64
Expected CAGR						**8.58%**		**20.74%**		**0.66%**		**7%**	

Source: Indian Horticulture Database 2013, www.nhb.gov.in, UNComtrade, Indiastat.com

1.2.3.3. Kiwifruit

Table 35: Export Potential analysis of Kiwifruit from India

	State wise Production data ('000 MT)					Production- India (in MT)	Exports - India (HS Code: 081050) (in MT)	Exports as % of production
	PN	HR	HP	Total production - Focus states	Production in Focus states' - Growth rate			
2011	0	0	0.20	0.20		5700.00	20	0.35%
2012	0	0	0.56	0.56	180%	7170.00	4	0.06%
2013	0	0	0.11	0.11	-80%	8240.00	6.074	0.07%
2014	0	0	0.20	0.20	82%	9576.67	-4	-0.04%
2015	0	0	-0.07	0.16	-23%	10735.56	-6	-0.05%
2016	0	0	-0.10	-0.02	-116%	12012.96	-13	-0.11%
2017	0	0	-0.29	0.00	-90%	13211.36	-17	-0.13%
Expected CAGR					**-7.86%**	**15.04%**	**-197.60%**	**0.02%**

Source: Indian Horticulture Database 2013, www.nhb.gov.in, UNComtrade, Indiastat.com

1.2.3.4. Walnuts

Table 36: Production & Export projections for Walnuts from the Focus States for next 3 yrs.

	State wise Production data ('000 MT)				India- Production & Exports Data (in MT)			Projected Export Potential from Focus States (in '000 MT)		
	PN	HR	HP	Total production - Focus states	Production from India (in MT)	Exports from India (in MT)	Exports as % of production	Exportable Surplus - focus region (20% of total production)	Estimated Export volumes - focus region (5% of M)	Estimated Export volumes in focus region- Growth Rate
2011	0	0	1.2	1.20	284400.00	5559.49	1.95%	0.24	0.01	
2012	0	0	1.48	1.48	233120.00	5615.23	2.41%	0.296	0.01	23%
2013	0	0	2.39	2.39	240630.00	7169.71	2.98%	0.48	0.02	61%
2014	0.00	0	2.88	2.88	208946.67	7725	3.70%	0.58	0.03	21%
2015	0.00	0	3.65	3.65	203392.22	8946	4.40%	0.73	0.04	27%
2016	0.00	0	4.23	4.23	180418.52	9724	5.39%	0.85	0.04	16%
2017	0.00	0	4.94	4.94	169057.65	10797	6.39%	0.99	0.05	17%
Expected CAGR (2014 to 2019)					**-6.82%**	**11.70%**	**3.89%**		**27%**	

Source: Indian Horticulture Database 2013

1.2.4. Peas

Table 37: Production and Export Projections for Peas (next 5 years)

	PRODUCTION - FOCUS STATES (In '000 MT)					Production-India (in MT)	EXPORTS (HS Code: 070810)			
	PN	HR	HP	Total production - Focus states	Production in Focus states' - Growth rate	Production-India (in MT)	Exports - India (in MT)	Exportable Surplus - focus region (20% of total production) (IN'000 MT)	Estimated Export volumes - focus region (1% of M) (IN'000 MT)	Export Volumes from Focus states - Growth rate
2004	0.00	80.90	0.00	80.90		3763600.00	2205.29	16.18	0.16	
2005	0.00	84.90	50.50	135.40	67%	4469400.00	1491.13	27.08	0.27	67%
2006	0.00	94.70	53.10	147.80	9%	4680900.00	1053.76	29.56	0.30	9%
2007	111.00	70.90	203.40	385.30	161%	2491100.00	704.32	77.06	0.77	161%
2008	112.00	91.20	202.50	405.70	5%	2916500.00	2192.30	81.14	0.81	5%
2009	115.50	64.30	237.30	417.10	3%	3011000.00	1764.819	83.42	0.83	3%
2010	200.60	340.20	254.20	795.00	91%	3517400.00	384.238	159.00	1.59	91%
2011	200.94	91.37	258.35	550.66	-31%	3744810.00	1148.054	110.13	1.10	-31%
2012	208.17	107.54	280.23	595.94	8%	4006170.00	4049.869	119.19	1.19	8%
2013	210.86	108.82	271.06	590.74	-1%	3868630.00	1191.863	118.15	1.18	-1%
2014	270.30	152.45	344.95	767.70	30%	3524077.50	1881.03	153.54	1.54	30%
2015	301.16	158.32	362.81	822.28	7%	3730491.67	2142.48	164.46	1.64	7%
2016	326.33	164.16	364.86	855.34	4%	4172047.34	2339.68	171.07	1.71	4%
2017	341.49	160.03	387.93	889.44	4%	4219945.11	2455.71	177.89	1.78	4%
2018	370.56	152.49	407.53	930.57	5%	4279035.18	2439.23	186.11	1.86	5%
2019	396.16	127.64	431.02	954.82	3%	4284642.07	2696.20	190.96	1.91	3%
Expected CAGR					**-69.93%**		**1.55%**		**41%**	
									1909.64	

Source: Indian Horticulture Database 2013, www.nhb.gov.in, UNComtrade, Indiastat.com

1.2.5. Potato

Table 38: Production and Export Projections for Potatoes (next 5 years)

	State wise Production data ('000 MT)					Production- India (in MT)	Exports - India (HS Code: 070190) (in MT)	EXPORTS FROM FOCUS STATES (In '000 MT)		Export Volumes from Focus states - Growth rate
	PN	HR	HP	Total production - Focus states	Production in Focus states' - Growth rate			Exportable Surplus - focus region (20% of total production)	Estimated Export volumes - focus region (1% of M)	
2004	1382.60	440.10	173.20	1995.90		23060100.00	55,077.10	399.18	3.99	
2005	1338.10	323.90	153.80	1815.80	-9%	23631300.00	79,237.01	363.16	3.63	-9%
2006	1223.50	374.40	95.90	1693.80	-7%	23905300.00	79,776.98	338.76	3.39	-7%
2007	1313.40	341.60	175.00	1830.00	8%	28599530.00	88,195.25	366.00	3.66	8%
2008	1477.30	352.20	175.00	2004.50	10%	34658300.00	171,163.05	400.90	4.01	10%
2009	2001.10	490.10	173.70	2664.90	33%	34390900.00	79,766.28	532.98	5.33	33%
2010	2116.50	494.80	0.00	2611.30	-2%	36577300.00	70,360.34	522.26	5.22	-2%
2011	2088.40	598.20	206.00	2892.60	11%	42339400.00	210,615.97	578.52	5.79	11%
2012	2104.00	618.90	206.20	2929.10	1%	41482800.00	113,083.97	585.82	5.86	1%
2013	2132.30	676.00	180.60	2988.90	2%	45343590.00	164,114.63	597.78	5.98	2%
2014	2363.3	667.84	169.19	3200.29	7%	48110462.67	168,724.39	640.06	6.40	7%
2015	2532.1	738.32	180.43	3450.86	8%	51238106.40	176,808.67	690.17	6.90	8%
2016	2691.3	790.83	191.26	3673.34	6%	54099103.45	186,992.81	734.67	7.35	6%
2017	2803.9	850.18	189.20	3843.28	5%	56337112.22	194,889.83	768.66	7.69	5%
2018	2887.7	896.75	201.05	3985.53	4%	58709198.95	201,042.81	797.11	7.97	4%
2019	2949.4	930.88	216.70	4097.01	3%	61796620.21	224,668.75	819.40	8.19	3%
Expected CAGR					**-74.89%**		**19.79%**		**10%**	

Source: Indian Horticulture Database 2013, www.nhb.gov.in, UNComtrade, Indiastat.com

1.2.6. Garlic

Table 39: Production and Export Projections for Garlic (next 5 years)

	State wise Production data ('000 MT)					Production- India (in MT)	Exports - India (HS Code: 070320) (in MT)	EXPORTS FROM FOCUS STATES (In '000 MT)		Export Volumes from Focus states - Growth rate
	PN	HR	HP	Total production - Focus states	Production in Focus states' - Growth rate			Exportable Surplus - focus region (20% of total production)	Estimated Export volumes - focus region (1% of M)	
2004	22500.00	0.00	0.00	22500.00		691100.00	1567.00	4500.00	45.00	
2005	22500.00	0.00	0.00	22500.00	0%	646600.00	2236.00	4500.00	45.00	0%
2006	24000.00	0.00	0.00	24000.00	7%	598200.00	32495.00	4800.00	48.00	7%
2007	24000.00	0.00	0.00	24000.00	0%	776300.00	12211.00	4800.00	48.00	0%
2008	25000.00	0.00	0.00	25000.00	4%	1068500.00	183.00	5000.00	50.00	4%
2009	44217.00	0.00	0.00	44217.00	77%	831100.00	859.00	8843.40	88.43	77%
2010	38441.00	0.00	0.00	38441.00	-13%	833970.00	17781.00	7688.20	76.88	-13%
2011	41314.00	0.00	0.00	41314.00	7%	1057800.00	24665.00	8262.80	82.63	7%
2012	41671.00	0.00	0.00	41671.00	1%	1228000.00	2784.00	8334.20	83.34	1%
2013	45000.00	0.00	0.00	45000.00	8%	1259000.00	25436.00	9000.00	90.00	8%
2014	49057.87	0.00	0.00	49057.87	9%	1311119.17	18584.80	9811.57	98.12	9%
2015	52771.48	0.00	0.00	52771.48	8%	1399788.52	18422.12	10554.30	105.54	8%
2016	56200.01	0.00	0.00	56200.01	6%	1457700.99	17238.25	11240.00	112.40	6%
2017	59381.86	0.00	0.00	59381.86	6%	1528972.73	22570.82	11876.37	118.76	6%
2018	61689.78	0.00	0.00	61689.78	4%	1664420.72	25644.47	12337.96	123.38	4%
2019	62828.75	0.00	0.00	62828.75	2%	1749156.20	26,049.46	12565.75	125.66	2%
Expected CAGR					**-81.52%**		**46.39%**		**15%**	

Source: Indian Horticulture Database 2013, www.nhb.gov.in, UNComtrade, Indiastat.com

1.2.7. Floriculture Products

Table 40: Production and Export volume projections for Floriculture Products (5 yrs.)

	Production : Loose in ' 000 MT and Cut in Lakh Number – FOCUS STATES					Production : Loose in ' 000 MT & Cut in Lakh Number - INDIA		EXPORTS FROM INDIA HS Code: 070200	EXPORTS FROM FOCUS STATES (In MT)		
Year	PN	HR	HP	Total production - Focus states (in Mn Nos.)	Total production - Focus states (in MT)	Production- India		Exports - India (in MT)	Exportable Surplus - focus region (20% of total production)	Estimated Export volumes - focus region (20% of M)	Export Volumes from Focus states - Growth rate
	Cut	Cut	Cut			Cut (in Mn Nos.)	Cut (in MT) (1 Mn flowers = 10 MT)				
2007	0.00	1053.00	566.00	161.90	1619.00	3718.00	37180.00	19573.90	323.80	64.76	
2008	0.00	929.00	566.00	149.50	1495.00	4365.00	43650.00	11014.27	299.00	59.80	-8%
2009	0.00	1084.00	605.00	168.90	1689.00	4794.00	47940.00	9228.07	337.80	67.56	13%
2010	0.00	1084.00	605.00	168.90	1689.00	66671.00	666710.00	0.00	337.80	67.56	0%
2011	0.00	1269.50	1893.80	316.33	3163.30	69027.00	690270.00	12999.64	632.66	126.53	87%
2012	0.10	1267.00	1948.10	321.52	3215.20	75066.00	750660.00	9958.63	643.04	128.61	2%
2013	0.00	11.30	12.40	2.37	23.70	958.00	9580.00	9465.80	4.74	0.95	-99%
2014	0.00	633.46	1226.93	186.04	1860.39	57257.93	572579.33	9465.80	372.08	74.42	7750%
2015	0.00	489.89	1285.42	177.53	1775.31	65224.24	652242.40	8840.65	355.06	71.01	-5%
2016	0.00	271.08	1282.91	155.40	1553.98	72753.54	727535.40	8154.67	310.80	62.16	-12%
2017	0.00	56.38	1192.91	124.93	1249.29	79268.61	792686.12	7958.49	249.86	49.97	-20%
2018	0.00	-164.86	954.63	78.98	789.77	83978.54	839785.42	9402.68			
2019	0.00	-286.22	1048.55	76.23	762.33	85708.27	857082.71	9916.33			
Expected CAGR							**8.40%**	**0.93%**		**169%**	**770.81%**

Source: Indian Horticulture Database 2013, www.nhb.gov.in, UNComtrade, Indiastat.com

1.2.8. Cereals

1.2.8.1. Barley

Table 41: Production and Export projections for Barley for next 5 years

	STATE WISE PRODUCTION DATA ('000 MT)					PRODUCTION FROM INDIA (in MT)	EXPORTS FROM INDIA (in MT)	EXPORTS FROM FOCUS STATES (in '000 MT)		
Years	PN	HR	HP	Total production - Focus states	Growth rate			Exportable Surplus - focus region (20% of total production)	Estimated Export volumes - Focus States (10% of M)	Estimated Export volumes Focus States - Growth rate
2004	77	73	31	181		1207100	4702	36.2	3.62	
2005	74	67	42	183	1%	1220600	210	36.6	3.66	1%
2006	63	76	18.4	157.4	-14%	1327900	72	31.48	3.15	-14%
2007	64	115	24.3	203.3	29%	1196100	294364	40.66	4.07	29%
2008	57	120	25.4	202.4	0%	1689100	219398	40.48	4.05	0%
2009	55	185	28.7	268.7	33%	1354700	29059	53.74	5.37	33%
2010	47	137	16.2	200.2	-25%	1662900	48887	40.04	4.00	-25%
2011	44	129	27.7	201	0%	1618700	44739	40.14	4.01	0%
2012	47	153	30.4	230	15%	1752400	117353	46.08	4.61	15%
2013	47	167	36.3	250	9%	1798064	119019	50.06	5.01	9%
2014	37.27	184	28.61	250	0%	1880248	110121	49.98	5.00	0%
2015	35.84	194.96	28.03	259	4%	1953836	86369	51.77	5.18	4%
2016	32.58	206.42	28.69	268	3%	2037945	42860	53.54	5.35	3%
2017	30.44	213.98	32.36	277	3%	2067003	62745	55.36	5.54	3%
2018	27.83	218.80	32.51	279	1%	2189461	89519	55.83	5.58	1%
2019	25.66	227.08	33.35	286	2%	2232674	83088	57.22	5.72	2%
Expected CAGR (2014 to 2019)					**2.26%**	**3.67%**	**21.10%**		**5%**	

Source: Indian Horticulture Database 2013

1.2.8.2. Pearl Millet

	STATEWISE PRODUCTION DATA ('000 MT)				Production from India (in MT)	Exports from India (in MT)	EXPORTS FROM FOCUS STATES (in '000 MT)		
	PN	HR	HP	Total production - Focus states			Exportable Surplus - focus states (20% of total production)	Estimated Export volumes - focus states (5% of M)	Estimated Export volumes from Focus States - Growth rate
2004	8.00	1006.00	0.20	1014.2	12109300	56698	202.84	10.14	
2005	7.00	749.00	0.20	756.2	7931300	119320	151.24	7.56	-25%
2006	5.00	679.00	0.10	684.1	7684000	80992	136.82	6.84	-10%
2007	6.00	1024.00	0.20	1030.2	8423700	105196	206.04	10.30	51%
2008	4.00	1161.00	0.20	1165.2	9970100	186390	233.04	11.65	13%
2009	5.00	1079.00	0.10	1084.1	8887100	137309	216.82	10.84	-7%
2010	4.00	932.00	0.10	936.1	6506400	157004	187.22	9.36	-14%
2011	3.00	1185.00	0.10	1188	10369900	132958	237.62	11.88	27%
2012	3.00	1177.00	0.10	1180	10276000	132958	236.02	11.80	-1%
2013	3.00	785.00	1.30	789	8742000	132958	157.86	7.89	-33%
2014	2.11	1083.67	0.61	1086	9708458	132958	217.28	10.86	38%
2015	1.85	1133.60	0.74	1136	9880906	133828	227.24	11.36	5%
2016	1.28	1129.80	0.87	1132	9906338	118554	226.39	11.32	0%
2017	1.02	1080.16	1.02	1082	9986016	121575	216.44	10.82	-4%
2018	0.43	1072.62	1.20	1074	10450064	115845	214.85	10.74	-1%
2019	0.12	1094.86	1.35	1096	10788114	115969	219.27	10.96	2%
Expected CAGR				**6%**	**3.57%**	**4.89%**		**6%**	**2.67%**

Source: Indian Horticulture Database 2013

1.2.9. Animal Products

1.2.9.1. Egg

Table 42: Production and export projections for Egg over next 5 years

Years	STATEWISE PRODUCTION DATA (in Lakh nos.)				Production from India (in lakh nos.)	Exports from India (in lakh nos.)	EXPORTS FROM FOCUS STATES (in Lakh Nos.)		
	PN	HR	HP	Total production - Focus states			Exportable Surplus - focus region (20% of total production)	Estimated Export volumes - focus region (10% of M)	Estimated Export volumes from Focus States - Growth rates
2008	36789.70	38149.81	977.30	39127.11	555624.39	662	7825.422	782.54	
2009	32828.13	38453.06	1000.26	39453.32	602670.37	275	7890.664	789.07	1%
2010	35449.01	39644.17	1020.62	40664.79	630243.9	449	8132.958	813.30	3%
2011	36030.00	41141.91	1049.66	42192	664499	479	8438.314	843.83	4%
2012	37911.01	42342.66	1069.39	43412	697307	479	8682.41	868.24	3%
2013	37434.92	43268.687	1093.52	81797	733627	392	16359.42	1635.94	88%
2014	39433.29	44669.0206	1117.28	85220	764363	276	17043.92	1704.39	4%
2015	40063.68	45866.233	1141.25	87071	799218	234	17414.23	1741.42	2%
2016	41051.47	46990.2041	1163.54	89205	832751	101	17841.04	1784.10	2%
2017	41851.78	48195.1512	1187.80	91235	866396	50	18246.95	1824.69	2%
2018	43213.56	49450.0927	1211.20	93875	898918	57	18774.97	1877.50	3%
2019	43945.96	50601.459	1234.87	95782	933330	29	19156.46	1915.65	2%
Expected CAGR (2014 to 2019)					**4.09%**	**-33.66%**		**10%**	

Source: DAHF; 2014

1.2.9.2. Buffalo Meat

Table 43: Production & Export volume Projections for Buffalo Meat for next 5 years

	STATEWISE PRODUCTION DATA ('000 MT)				Production from India (in '000 MT)	Exports from India (in '000 MT)	EXPORTS FROM FOCUS STATES (IN '000 MT)		
Years	PN	HR	HP	Total production - Focus states			Exportable Surplus - focus region (20% of total production)	Estimated Export volumes - focus region (5% of M)	Export Volumes from Focus State - Growth rate
2008	53.3	0	0	53.3			10.66	0.53	
2009	66.49	0	0	66.49	2250.00	1100.00	13.298	0.66	25%
2010	89.12	0	0	89.12	2500.00	1250.00	17.824	0.89	34%
2011	93	0	0	93	3308.00	1268.00	18.674	0.93	5%
2012	122	0	0	122	3491.00	1411.0	24.424	1.22	31%
2013	134.24	0	0	134	3800.00	1765.0	26.85	1.34	10%
2014	151.61	0	0	152	4125.00	2082.0	30.32	1.52	13%
2015	167.85	0	0	168	4250.00	1950.0	33.57	1.68	11%
2016	187.37	0	0	187	4780.86	2400.0	37.47	1.87	12%
2017	201.87	0	0	202	5087.92	2478.0	40.37	2.02	8%
2018	219.46	0	0	219	5316.03	2692.8	43.89	2.19	9%
2019	236.14	0	0	236	5651.09	2921.0	47.23	2.36	8%
Expected CAGR (2014 to 2019)					**4.86%**	**3.33%**		**10%**	**14.87%**

Source: DAHF; 2014

1.3. State wise status of available Exit Point Infrastructure within the Focus States

1.3.1. List of ICDs/CFSs in Focus States

Table 44: List of ICDs in Focus States

State	Name of ICD/CFS	Type of ICD/CFS	Location
Haryana	Tughlakabad(TKD)	Rail ICDs with CFSs	New Delhi
	Riwari	Rail ICDs with CFSs	Haryana
	Dadri(Greater Noida)	Rail ICDs with CFSs	Delhi
	Babarpur	Road ICDs with CFS	Panipat
Punjab	Dhandarikalan	Rail ICDs with CFSs	Ludhiana

Source: Translog India, International freight forwarder and customs broker (www.translog.in/ics**india**.html)

1.3.2. Comparative analysis of Exit Point Infrastructure in Focus States

Table 45: At select airports

	Delhi Airport	Amritsar Airport	Mumbai Airport
1. Sectors covered	57 airlines operating to cover various sectors	Arrivals for all international traffic. Departures to Afghanistan, Russian Federation, Qatar , etc. through Air India, Air India Express, Turkmenistan Airlines, Uzbekistan Airlines, Qatar airways 1 international terminal	China, US, UK, Japan, Malaysia, Iran, Kenya, Ethiopia, Qatar, France, Switzerland, Saudi Arabia, Turkey, Mauritius, UK, Thailand

2. Container Terminal/ Air Cargo Complex/Terminal	Dedicated State of art of Center for Perishable Cargo spread over an area of 1127 sq. mt.: - X-ray screening facility for perishable cargo - 1 pre cool room and 1 examination area to facilitate customs' clearance and other documentation - 3 cold rooms – one each for livestock products (0 – 4 deg C), F&V (10-12 deg C) and flowers (0 – 4 deg C) - ETV (Elevating Transfer Vehicle) corridor and handling room for handling container cargo	1 dedicated cargo terminal with an area of 2256 sq. mtr.	Dedicated Cargo terminal, MIAL Cargo
3. Container Cargo handling capabilities	On an average, 140,000 to 200,000 MT of export cargo is handled by the airport every year. **<u>CPC:</u>** Utilization activity per day = 228 Pallets ,146 containers Tonnage handled YoD in 2010-2011 = 1,31,347 MT Import Disposal Area = 12,643 Sq. Mtrs Destuffing Activity per day Shift (Avg):85 Pallets/35 Containers (Avg. 425 MT) Tonnage Handled (2010-11) = 144,410 MT (+ 10% growth) MT	Details not available	Details not available
4. Storage Capacity	348 ULD storage positions 6 mechanized built up stations with 24 build up positions Covered area of 340000 sq. mtrs Import Warehouse = 37,000 Sq. Mtrs	g) Separate storage area for dangerous goods h) Adequate truck dock area i) Separate cargo bay for parking the cargo A/craft	j) Trans-shipment cargo storage facility b. Cold Storage: Export state-of-the-art k) Perishable Centre: Temp. range: +15 to +25 ^{o}C, +2 to +8 ^{o}C, 0 to -10 ^{o}C , One time holding capacity: 160 Tons, Annual Handling capacity: 50,000 Tons

			l) Cold Storage: Temp. range: +15 to +25 °C, +2 to +8 °C, One time holding capacity: 120 Tons, Annual Handling capacity: 30,000 Tons
5. Port Infrastructure	Accredited Phytosanitary labs and quality inspection agencies are required on-site to ensure on-site physical verification of cargo.	Good hinterland connectivity with Ludhiana, Chandigarh and Amritsar Railway station in Punjab and few districts of Haryana.	Regulators available on-port: Indian Customs, Animal Quarantine, Plant Quarantine, Drug Control, Airport Health Officer, Food Safety & Standards Authority of India, Wild Life Protection Authority and Bureau of Civil Aviation Security
6. CFS Space	Not available	Details not available	Not available
7. Cargo handling equipment/facilities	Owned by CTO	Details not available	Owned by airline
8. CPCs	Yes	No, but required	Yes, increase in capacity required

Source: Respective website of airports and Airport Authority of India website (http://www.aai.aero/public_notices/aaisite_test/main_new.jsp)

Table 46: At major ICDs/CFSs in Focus States

STATE	**PUNJAB**	**HARYANA**	
ICDs	**ICD Ludhiana**	**ICD Garhi Harsaru**	**ICD PBH**
Locations catered to	Punjab, Himachal Pradesh, Chandigarh, Jammu & Kashmir and northern Haryana.	NCR (Gurgaon, Manesar, Faridabad, Ghaziabad), Haryana (Hisar, Panipat, Sonepat) and Rajasthan (Bhiwadi, Rewari, Dharuhera, Neemrana).	Faridabad, Ballabhgarh, Palwal and Noida
Capacity Handled (annually)	300,000 TEUs capacity	2,60,000 TEUs per year	150,000 TEUs

Agri commodities handled	Non-Basmati rice, Dairy products, cereal preparations, Fresh grapes and assorted vegetables, walnuts, etc.	Buffalo Meat, Fresh & processed vegetables, etc.	Dairy products, cereal and cereal preparations and processed fruits and vegetables
Cargo handling capabilities	Details not available	Details not available	Details not available
Transportation facilities	10 weekly services to Mundra port 3 weekly services to JNPT, Nhava Sheva 3 weekly services to Pipavav	182 trailers	Fleet of trailers available
Warehousing facilities	Transit and temperature controlled Warehousing (4000 sq mt)	Details not available	2,100 sq mt capacity being expanded to 4,200 sq mt Bonded area of 500 TEUs ground slots with 2,000 TEUs total capacity
Special facilities (reefer points, temperature controlled warehousing, etc.)	Spacious container yards (165,000 sq mt) Customs clearance with EDI facility Advanced container handling equipment	110 reefer points Temperature-controlled warehousing Spacious container yards (150,000 sq mt) Customs clearance with EDI facility Advanced container handling equipment	Bonded and transit warehouses On-site customs office with EDI facility Reefer points Spacious container yards Advanced container handling equipment
Port connectivity/services		a) 25 services from ICD Garhi-Harsaru, Gurgaon to JNPT (Nhava Sheva), Mumbai every month b) 8 services from ICD Garhi-Harsaru, Gurgaon to Mundra every month c) Daily services between maritime ports d) 10 services to Pipavav every month e) Regular reefer services to Kalamboli f) Double stack services to Mundra and Pipavav	
Hinterland connectivity/Services	Excellent connectivity to NH-1	Details not available	Well connected to the Kundli-Manesar- Palwal Expressway and the Faridabad-Ghaziabad-Noida corridor
Services offered for export cargo	Details not available	Details not available	Details not available

Any other information (business service tie ups, upcoming projects, initiatives in offing, etc.)	Punjab's first private rail-linked logistics park cum Inland Container Depot	-	-

Source: APEDA Agri Exchange

1.4. Current status of export of agri commodities from major exit points within the Focus States

Table 47: Port wise export of agri commodities from Punjab

PUNJAB - PORT WISE EXPORTS		
Major Exit Points	**Average Of Quantity For 3 Years**	**% Share Of Total Agri Exports From The Port**
Amritsar Rly.Stn.	**23793.25**	
Alcoholic Beverages	3.00	0.01%
Cereal Preparations	18.63	0.08%
Dairy Products	37.89	0.16%
Dried & Preserved Vegetables	38.23	0.16%
Floriculture	0.41	0.00%
Fresh Grapes	89.97	0.38%
Fresh Onions	422.27	1.77%
Fruits & Vegetables Seeds	4989.76	20.97%
Groundnuts	677.72	2.85%
Jaggery & Confectionery	0.17	0.00%
Maize	461.03	1.94%
Miscellaneous Preparations	47.03	0.20%
Natural Honey	2.12	0.01%
Non-Basmati Rice	14.18	0.06%

Other Cereals	11573.94	48.64%
Other Fresh Fruits	4140.03	17.40%
Other Fresh Vegetables	600.69	2.52%
Other Processed Fruits & Vegetables	198.82	0.84%
Pulses	477.35	2.01%
Attariroad,Amritsar Road/ Railway	**320374.18**	
Buffalo Meat	192.51	0.06%
Cereal Preparations	480.07	0.15%
Dried & Preserved Vegetables	23.76	0.01%
Fresh Onions	28691.81	8.96%
Fruits & Vegetables Seeds	5.71	0.00%
Other Fresh Fruits	7.36	0.00%
Other Fresh Vegetables	290948.33	90.82%
Pulses	19.96	0.01%
Sheep/Goat Meat	4.67	0.00%
CFS/ICD Chheheta Amritsar	**57319.49**	
Basmati Rice	52621.78	91.80%
Cereal Preparations	19.10	0.03%
Dairy Products	0.33	0.00%
Dried & Preserved Vegetables	0.00	0.00%
Floriculture	0.00	0.00%
Fresh Grapes	0.22	0.00%
Jaggery & Confectionery	13.39	0.02%
Milled Products	87.78	0.15%
Miscellaneous Preparations	3.47	0.01%
Non-Basmati Rice	4569.50	7.97%
Other Fresh Fruits	0.68	0.00%
Other Processed Fruits & Vegetables	3.24	0.01%
ICD Ludhiana	**404168.44**	

Alcoholic Beverages	17676.73	4.37%
Basmati Rice	252182.57	62.40%
Casein	37.14	0.01%
Cereal Preparations	26742.31	6.62%
Cocoa Products	10.65	0.00%
Cucumber And Gherkins(Prepd. & Presvd)	0.01	0.00%
Dairy Products	1051.30	0.26%
Dried & Preserved Vegetables	64.48	0.02%
Floriculture	0.46	0.00%
Fresh Grapes	0.94	0.00%
Fruits & Vegetables Seeds	18.55	0.00%
Groundnuts	0.00	0.00%
Jaggery & Confectionery	1542.59	0.38%
Maize	29.33	0.01%
Mango Pulp	0.57	0.00%
Milled Products	2347.32	0.58%
Miscellaneous Preparations	696.16	0.17%
Natural Honey	7481.17	1.85%
Non-Basmati Rice	89225.80	22.08%
Other Cereals	0.96	0.00%
Other Fresh Fruits	82.07	0.02%
Other Fresh Vegetables	36.00	0.01%
Other Processed Fruits & Vegetables	2975.16	0.74%
Pulses	0.28	0.00%
Walnuts	1953.55	0.48%
Wheat	12.33	0.00%
ICD/CFS Jalandhar	**3960.19**	
Basmati Rice	3002.65	75.82%
Cereal Preparations	36.54	0.92%

Dairy Products	6.15	0.16%
Fresh Grapes	0.84	0.02%
Jaggery & Confectionery	9.29	0.23%
Milled Products	216.94	5.48%
Miscellaneous Preparations	65.82	1.66%
Natural Honey	0.02	0.00%
Non-Basmati Rice	343.56	8.68%
Other Fresh Fruits	0.11	0.00%
Other Fresh Vegetables	0.17	0.00%
Other Processed Fruits & Vegetables	277.29	7.00%
Pulses	0.82	0.02%
Rajasansi (Amritsar) Airport	**23.49**	
Cereal Preparations	0.49	2.10%
Dried & Preserved Vegetables	0.12	0.50%
Fresh Grapes	0.05	0.21%
Jaggery & Confectionery	0.42	1.77%
Miscellaneous Preparations	0.02	0.07%
Other Fresh Fruits	0.80	3.42%
Other Fresh Vegetables	20.43	86.97%
Other Processed Fruits & Vegetables	1.11	4.74%
Walnuts	0.05	0.21%
Grand Total	**809639.04**	

Source: APEDA Agri Exchange

Table 48: Port wise export of agri commodities from Haryana

Haryana - Port Wise Exports		
Major Exit Points	Average Quantity Exported (3 Years)	% Of Total Products Exported From The Port
Concor ICD Ballavgar Faridabad	**132.00**	
Non-Basmati Rice	132.00	100%
ICD Babarpur Panipat	**425.48**	
Fresh Onions	27.33	6%
Miscellaneous Preparations	25.52	6%
Other Processed Fruits & Vegetables	372.63	88%
ICD Faridabad	**13748.33**	
Basmati Rice	322.62	2%
Casein	19.67	0%
Cereal Preparations	9.08	0%
Dairy Products	744.37	5%
Dried & Preserved Vegetables	0.13	0%
Fruits & Vegetables Seeds	3.36	0%
Milled Products	144.68	1%
Miscellaneous Preparations	40.80	0%
Natural Honey	0.03	0%
Non-Basmati Rice	12298.65	89%
Other Fresh Fruits	0.17	0%
Other Processed Fruits & Vegetables	0.10	0%
Wheat	164.67	1%
ICD Garhiharsaru	**312199.97**	
Alcoholic Beverages	1.93	0%
Basmati Rice	146230.65	47%
Buffalo Meat	93968.84	30%
Casein	857.00	0%
Cereal Preparations	1655.69	1%

Cocoa Products	0.01	0%
Dairy Products	384.35	0%
Floriculture	7.13	0%
Fresh Grapes	0.04	0%
Guargum	48598.65	16%
Jaggery & Confectionery	28.12	0%
Milled Products	1230.27	0%
Miscellaneous Preparations	1718.97	1%
Natural Honey	0.44	0%
Non-Basmati Rice	17005.96	5%
Other Cereals	3.33	0%
Other Fresh Fruits	0.03	0%
Other Fresh Vegetables	77.10	0%
Other Processed Fruits & Vegetables	144.53	0%
Pulses	10.23	0%
Sheep/Goat Meat	261.02	0%
Wheat	15.67	0%
ICD Patli	**201364.21**	
Alcoholic Beverages	29.50	0%
Animal Casings	1.30	0%
Basmati Rice	154689.99	77%
Casein	2674.67	1%
Cereal Preparations	987.59	0%
Cocoa Products	0.08	0%
Dairy Products	412.04	0%
Fresh Grapes	0.07	0%
Groundnuts	6.62	0%
Guargum	7845.03	4%
Jaggery & Confectionery	0.45	0%
Maize	282.33	0%
Milled Products	2168.30	1%

Miscellaneous Preparations	442.38	0%
Natural Honey	0.03	0%
Non-Basmati Rice	25033.04	12%
Other Cereals	5.00	0%
Other Fresh Vegetables	0.05	0%
Other Processed Fruits & Vegetables	417.13	0%
Pulses	2.67	0%
Wheat	6365.93	3%
ICD Piyala Ballabhgarh Haryana	**6803.97**	
Basmati Rice	922.45	14%
Cereal Preparations	6.77	0%
Dairy Products	4311.83	63%
Milled Products	303.89	4%
Miscellaneous Preparations	0.24	0%
Non-Basmati Rice	1257.00	18%
Other Cereals	1.67	0%
Other Processed Fruits & Vegetables	0.12	0%
ICD Rewari	**80630.46**	
Basmati Rice	53813.41	67%
Cereal Preparations	4.33	0%
Guargum	11090.82	14%
Milled Products	13.33	0%
Miscellaneous Preparations	616.48	1%
Non-Basmati Rice	15092.08	19%
Grand Total	**615304.42**	

Source: APEDA Agri Exchange

1.5. Introduction of Exotic/High Value Crops

There will have to be different structures for different products. For Kiwis the structure would be different while for strawberries the structure will be different. The example Kiwi has been taken only as an illustration.

First Stakeholder – International Company present in trading and farming of Kiwis in say New Zealand (it is the largest producer)

Second Stakeholder – Contract farmers, at the initial stage farmers who can invest reasonable amount of money in a new crop and also about 10-20 acres to allocate to the crop

Third Stakeholders – Government, which would be required to hand hold the first 1-3 companies to get the planting material tested and approved for cultivation in India

The farmers would be provided planting material, training and monitoring and handholding support by the international Company involved in kiwi cultivation. This support would be provided along the entire life cycle.

When the produce is harvested, the company will have the first right of refusal for procurement of the produce. The company will typically collect the entire produce and grade and sort it export about 40% of the produce while releasing the remaining 60% in the domestic market.

Such product developments are critical for the growth of the export industry as we have the old example of apples which is not a native Indian crop and was introduced by the missionaries during the British era. We also have the example of Gherkins which is neither an Indian crop does it have a market in India. However in the 10 years since its introduction in the Indian market, India has become one of the leading exporters of gherkins in the world.

The Role APEDA would be to co-ordinate and facility the Kiwi project while the state government will have to ensure speedy clearances of all approval including testing and approving the planting material.

Such an arrangement can also be replicated for other high value or exotic crops to have conducive climatic conditions/ attain extended crop cycles in Punjab, Chandigarh & adjoining areas.

Estimated Costing for a Controlled Atmosphere Greenhouse

High cost controlled atmosphere greenhouse may be a multispan structure. The cost estimates may vary considerably depending upon crop (cost of planting material & spacing requirements will define the total number of plants required and therefore, the total cost incurred on planting material), type of cladding material and environmental control system. Land cost may depend on size of greenhouse & installation location. The additional cost involved per sq. m. is stated below.

Table 49: Estimated additional costing for a Controlled Atmosphere Greenhouse

Sr. No.	Specifications	Cost (Rs./sq. m.)
1	Polyhouse including thermal screen	670
2	If double layer polyethylene used	110
3	CO2 generation & distribution	170
4	Evaporative cooling	220
5	Heating System	110
6	Humidification System	110
7	Lighting	220
8	Night curtain/shading system	165
9	Drip system	125
10	Nutrient application system	110
11	Land Preparation cost/Porous flooring	100
12	Benches	165
13	Structural Cost	330
14	Miscellaneous	200
	Average Cost of High Cost Greenhouse (per sq. mt.)	**2805**

Based on above cost estimates, a 10 ha controlled atmosphere greenhouse with a basic environmental control system would cost around Rs. 28.05 Cr. (excluding land cost, cost of planting material & cladding material). Various government subsidy schemes for setting up of greenhouses, purchase of high quality planting material and installation of micro irrigation system can also be leveraged upon by the private players to make the returns from the greenhouse more economical.

1.6. Research/Business Incubators to support product development efforts in Food Processing Sector

The Concept

Based on our analysis, it can be inferred that the Focus States showcase substantial agri export potential. However, limited access and availability of both processing and export infrastructure, existing knowledge gap of farmers pertaining to quality compliance and assurance, dearth of quality testing/certification infrastructure and assistance are some of the stumble blocks holding back the states to achieve the actual potential. Though these issues need individual attention and management mechanisms, a Food Business Incubator can serve as a platform to provide shared access to laboratory and research space and an ideal simulating environment for collaboration between academic research and the industry to spawn innovation and aid in driving economic growth in the region.

Research parks/business incubators provide a unique opportunity to optimally tap-in the sector growth potential available in the region by stimulating innovation and promote entrepreneurship in the food sector. These parks enable creation of common research platforms, not only facilitating increased access to technology but also bridging the gap between industry and academia. Integration of technology transfer services provides commercialization opportunities to both entrepreneurs and academic researchers, invigorating research and entrepreneurship in the sector. Further, sharing and pooling of resources reduces/distributes risk capital, thereby ensuring sustainability of the business without compromising on innovation. Also, considering the lack of university driven research ecosystem, these parks would provide a location in which researchers and companies operate in close proximity, and create an environment that fosters collaboration and innovation and promotes the development, transfer, and commercialization of technology. This belief that shared facilities, coupled with geographical proximity, can facilitate the transition of ideas from universities and laboratories to private markets has led to a rise in the numbers of research parks being built across the globe.

PPP models have been the strategy of choice for development of such facilities, especially in the Indian context where the academia-industry relationship is not contiguous and where SMEs/individual entrepreneurs/researchers possess the 'DNA' to drive the innovation potential in the sector. A PPP model brings together the Government's ability to invest in high-end technology, and enables the private entity to gain access to working with the technology, thereby creating an ideal environment for collaboration, research, innovation, and economic growth in the region.

Need & relevance

Making an allowance for the potential benefits of a research/business incubator for the food processing sector, we suggest that the region should evaluate establishing a business incubator to foster innovation customized to region specific needs and drive entrepreneurship to increase private sector investment & engagement in the sector. In addition to these, the incubator will also provide opportunities for industry-academia, private-public and private-private linkages to help comprehensively explore the sector potential to reap maximum economic, social and technological benefits.

The governments in Focus States of Haryana & Himachal Pradesh have initiated investment and efforts for establishing research parks/incubator parks for biotechnology sector. In Himachal Pradesh, the government aims to catalyze an investment of INR 500 crore for establishing biotechnology incubation center over 35 acres of land area in Solan. Amongst other

biotechnology sub-sectors, the park will help in conducting R&D in the fields of value-added fruit processing and bio-fresh processing. Similarly, Haryana state government, with support from Department of Science and Technology has received a grant of 5.52 lakhs for setting up a biotechnology park at Manesar in Gurgaon district at a cost of Rs ten crore.

Some similar notable incubators/research parks in the region are listed as follows:

Table 50: Notable incubators/research parks in the region

Name of the Incubator	Location	Focus Area
Amity Innovation Incubator	Noida, Uttar Pradesh	Rural Innovation and Social Entrepreneurship, Information and communication Technologies (to include Social media and ecommerce, Mobile computing and technologies, Analytics, Cloud computing and Big Data), Education and Education Technologies, **Food and allied Technologies**, Biotechnology and Life Sciences, Nanotechnology and Material Sciences
IAN Incubator	New Delhi	IT/ITES, Telecom, Mobile VAS, Gaming and Animation, Internet/Web, Media and Entertainment, Education technology, Healthcare technology, Manufacturing Products, Alternative Energy, Clean Technology, Cloud computing, Retail technology
Veddis Ventures	Gurgaon, Haryana	Consumer technology
Technology Business Incubator	IIT, Delhi	Industrial Microbiology & Biotechnology with an emphasis on fermentation based production of different bioactive molecules

The suggested food business research park/incubator can be housed within such existing research parks/business incubators. However, this would require consideration on sector complementarity in terms of resource/lab space & equipment utilization and prevailing synergies between the research outputs, industry needs and business opportunities for existing sectors in the park and the food processing sector. Alternatively, it can also be built as a standalone unit dedicated to food processing sector.

Critical Success Factors

The success of any Incubation Park is judged from the efficacy of its operations, number of successful enterprises, impact created in the region and good financial health. During our course of study, we have identified the below captured group of factors that are imperative for such an incubation center:

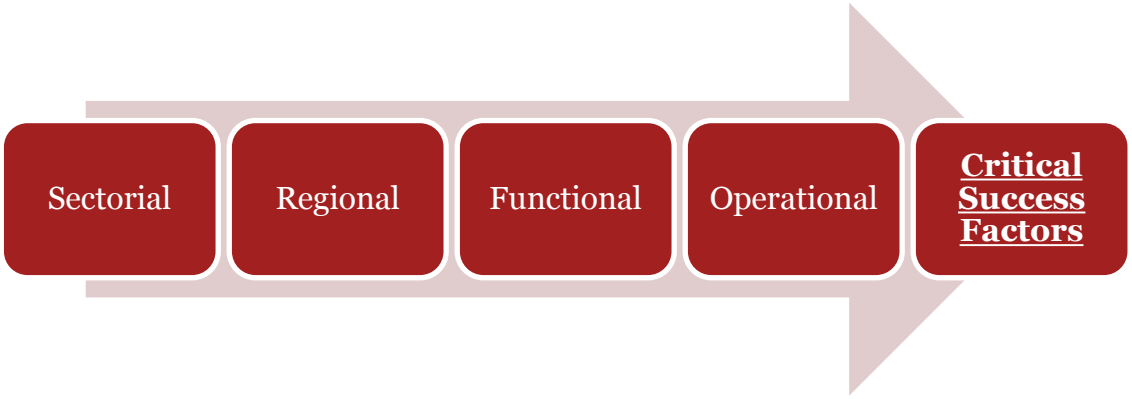


Figure 78: Critical Success Factors for an Incubation Center

Sectorial Factors: These factors form the base for establishment of any Incubation Park. For a resource-intensive activity like business incubation, it is vital to identify and engage in the sectors/industries that have the potential to grow, are involved in innovative research for new products & technologies and require the incubation environment for commercialization.

Need for incubation support to assist SMEs and individual entrepreneurs to optimally leverage the current growth potential of the sector and an inherent sectorial need for innovative research for new products & technologies (value addition for shelf life enhancement, for adding novel product attributes, for developing new products for tapping newer markets or new customer segments in existing markets, etc.) are pertinent sectorial factors that state the need of an incubation center for the Food Processing Sector.

Regional Factors: We have analyzed the agribusiness export potential and support infrastructure landscape in the Focus states. Significant production base & export potential, increasing demand for value added produce in international markets, consistent quality requirements, and changing consumer lifestyles demand for innovation in the food processing sector in the Focus States. Crop specific research to develop newer products and/or innovative technologies purposes an ideal environment for an incubator park. The Focus States has all the components required to trigger economic growth through innovation.

The factors identified in the Focus States that are most essential in determining the placement location to set up an Incubation Center for the purposes of aiding industry and academic collaboration to initiate innovation are: Entrepreneurial Culture, current industry engagement & availability of industry expertise in the region, intellectual capital to drive innovation

& product development efforts in the sector at the regional level and easy availability of allied services (such as testing & analytical services, product conformity assessment services, etc.).

Functional Factors: To attract business units, an incubator should be well-equipped functionally. The park/center should provide support services throughout product development and commercialization life cycle for new ventures and offer strong mentorship avenues for the small start-ups. Incubation parks should also act as a gateway to knowledge and new ideas/technologies and help occupants to become more innovative to accelerate their development. The park should aim and make considerable efforts at bringing various players academia + research + industry together with easy MOU's for ease of access to one another. The park should be viewed as promotional effort of the government towards increasing the Food Processing industry and expect the financial returns to be moderate. We have identified the below functional factors that are imperative to drive the functional success of such a business park/incubator center:

- ***Connectivity to Technical Expertise*** to facilitate provision of mentorship access and linkages to domain area experts, middle and senior level executives, successful entrepreneurs and heads of academic institutions.
- ***Networking & Business Development*** – Networking is important as it gives occupants an access to a wide range of professional services (legal, accounting, taxation, IP), business support, skills, markets and customers, and finance.
- ***Financial Advisory and support*** – The Park should provide access or linkage to consulting services to help new ventures in acquiring seed funding, accounting, as well as exit strategies. This would help occupants achieve innovation & research goals without marginalizing profitability
- ***Legal & Regulatory Support*** – The Park, if possible, can also provide access or linkage to a corporate attorney or an advisor on regulatory approval, tech transfer, and patenting. A separate legal unit under the host institutions can provide autonomy. This support service is advisable, if the food business park/incubation center is developed as a separate entity under a full-fledged research park/incubation center, not in case of a standalone unit as it may hamper viability of such a service and of the entire Park as a whole.

Operational Factors: The sustainability and success of an Incubation Park depends on its operational conditions. Basis our research, we recommend a Public-Private partnership model to provide access to facilities and services either in-house or outsourced. It will help in bringing all kinds of resources especially market linked commercial knowledge and intellectual resources apart from better execution skills and faster decision making processes. The space, infrastructure and facilities provided should be tailored to the needs of incubates, and yet be flexible enough to meet their changing needs with technological advances over time.

The government of India also provides support for establishing such research/incubator parks through various schemes and support mechanisms. Some of them are listed below:

1) TDB Scheme for Seed Support to Technology Business Incubators/ Science and Technology Parks, under Ministry of Science & Technology; Government of India, provides financial assistance to an incubatee upto Rs. 25 lakhs per incubatee

2) Technology Business Incubator (TBI) Project, supported by National Science and Technology Entrepreneurship Development Board, Department of Science and Technology (NSTEDB), Government of India, to set up a Globally recognized business incubator for technology ideas emphasizing IT, Biotechnology and Electronics and engineering product technologies

3) Technopreneur Promotion Programme (TePP), by Department of Scientific & Industrial Research (DSIR), Government of India, to provide grants, technical guidance and mentoring to independent innovators to emerge as entrepreneurs by incubating their idea and enterprise

4) NSTEDB Seed Fund Support Scheme, supported by Ministry of Micro, Small & Medium Enterprises (MSME), Government of India, provides grants and helps MSMEs pursue development & commercialization of technology innovations

Project Cost

Following is an indicative project cost for a 10,000 sq. ft. basic Biosafety Level (BSL) 1 facility for food processing research & product development:

Table 51: Project Cost of 7.7 Crores for a 10,000 sq. feet basic BSL- 1 facility

Particulars	Area	Assumption	Cost (in Rs.)
Area (Sq. Ft.)	10,000		
Land & Land Development	10,000	100	1,000,000
Civil Construction	10,000	3,000	30,000,000
HAVC	10,000	2,500	25,000,000
Electricity	10,000	150	1,500,000
Fire Fighting	10,000	50	500,000
Fittings	10,000	150	1,500,000
Pipeline	10,000	50	500,000
Building Management System			1,000,000
Transformer / Switch board			2,500,000
Power Backup	500KVA		3,000,000
Laboratory Equipment			1,000,000

STP/ETP		2,500,000
Others1		
Others2		
Others3		
Contingencies	10%	7,000,000
Total Cost		**77,000,000**

1.7. Establishment of Complaint Management/Grievance Redressal Portal to manage & curtail unethical export practices

The Concept:

Quality of Indian exports in international markets has long being questioned. The government & export regulatory bodies have taken several interventions such as setting up of export inspection laboratories, export oriented units with integrated post-harvest & export infrastructure, schemes & subsidies for infrastructure development (Mega Food parks, Cold Chain Development), etc. However, all these measures are long term policy/development steps. There exists a parallel need to instantaneously register, track and resolve Indian ExIm grievances. Therefore, to address quality issues pertaining to agricultural & food exports from India, we propose an online system for feedback & compliant registration and grievance redressal for malpractices. Such a portal will provide the shortest possible, one-stop solution platform for feedback, complaint registration & grievance/complaint redressal/resolution. The statistics collected from the Portal can be used to monitor, track and manage unethical export practices which will, in turn, benefit both Indian agri-traders and government/export regulatory agencies.

Mechanism of Implementation:

This portal will be established by and under the guidance of APEDA expert team. Only APEDA - registered Exporters & Importers can access the portal with a secured login. Through these login credentials, each of the parties can login & register a complaint/grievance regarding various unethical practices pertaining to quality specifications, SPS requirements, ease of transaction/payment, etc. The information on the portal will be available in public domain. Based on complexity of the issue, APEDA can take up/ assign the issue to the designated authority for further action. A specific time of resolution could also be assigned to each issue and the issue will be resolved within the specified time. The olution & status of proposed action items could also be posted on the portal to sensitize the stakeholders on the ramifications of unethical export practices. Either of the transacting parties could be contacted for seeking further details, as required, using the portal.

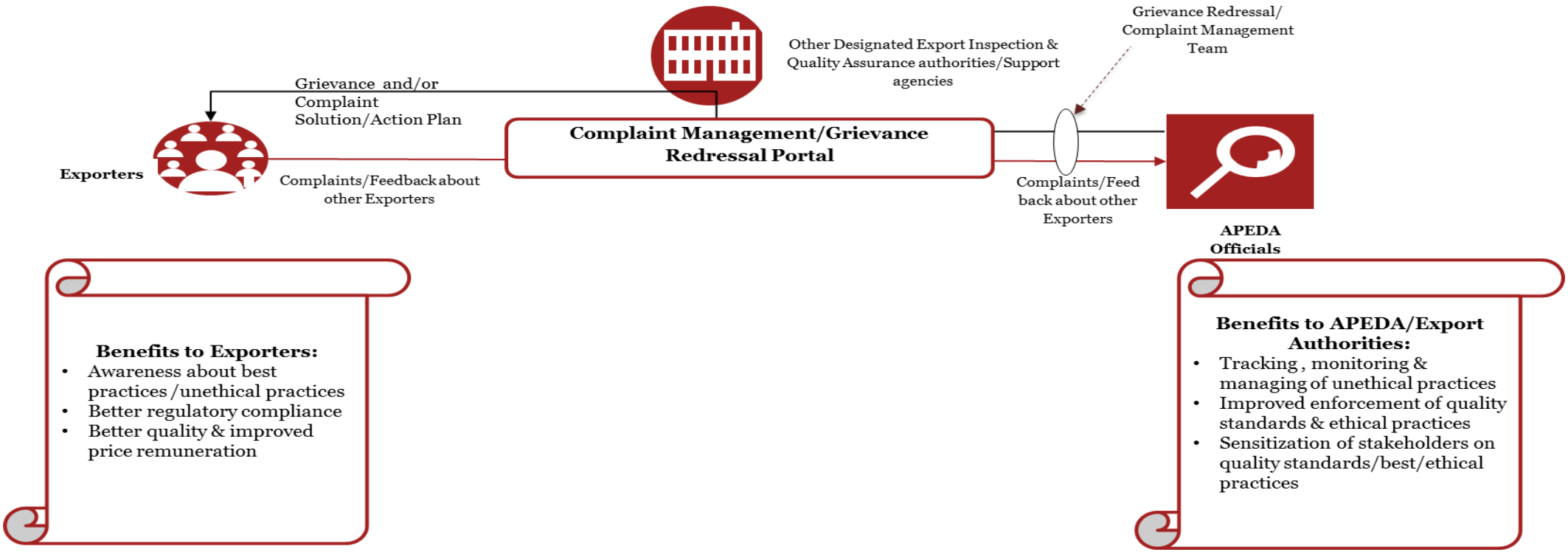


Figure 79: Mechanism & benefits of the proposed Complaint Management/Grievance Redressal Portal

Revenue/Fee:

- ✓ All registered APEDA exporters & importers shall be charged a minimum registration fee. Registration would be valid for a period of 6 months-1 year. Upon expiry of registration, in order to login & access the account, the trader needs to pay the registration fee.
- ✓ Based on frequency & complexities of the issue, financial penalties can be levied on the responsible parties.

All such accrued revenue would be utilized for website maintenance & Grievance Redressal Team Management purposes.

Responsibilities of APEDA & its agencies:

- Creation, establishment & oversight of the Complaint Registration/Feedback portal
- Selection, appointment, training & maintenance of the Complaint Management/ Grievance Redressal Team
- Revenue collection & disbursal
- Feedback, complaints/grievance analytics
- Actions & measures for rectification & elimination of unethical agri-trade practices

Disclaimer

This report has been prepared for and only for APEDA, India in accordance with the agreed terms and conditions as per the contract and for no other purpose. We do not accept or assume any liability or duty of care for any other purpose or to any other person to whom this report is shown or into whose hands it may come save where expressly agreed by our prior consent in writing.

The opinions contained in this report are based on the facts, assumptions, and representations stated herein. Our assessment and opinions are based on the fact and circumstances provided/ collected during our meetings with related officials and research from sources in public domain held to be reliable. If any of these facts, assumptions or representations are not entirely complete or accurate, the conclusions drawn therein could undergo material change and the incompleteness of inaccuracy could cause us to change our opinions. The assertions and conclusions are based on the information available at the time of writing this report.

The procedures we carried out in performing the work that forms the basis of this report were not as to constitute an audit. As such, the content of this report should not be considered as providing the same level of assurance as an audit. PwC disclaims all liability to any third party who may place reliance on this report and therefore does not assume responsibility for any loss or damage suffered by any such third party in reliance thereon.

This report is provided on the basis that it is for the use of APEDA, India only and that it (and any extract of it) will not be copied or disclosed to any third party or otherwise quoted or referred to, in whole or in part, without PwC prior written consent. Furthermore, PwC will not be bound to discuss, explain, or reply to queries raised by any agency, other than the intended recipient of this report.