

*Study on
identification
of export
oriented
integrated
infrastructure
for agri
products from
Karnataka &
Tamil Nadu*
APEDA
(Agriculture
Produce Export
Development
Authority)

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pwc

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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. 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

Segment	Market Overview	Opportunities
Meat & Poultry	The segment is dominated by unorganized	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Equally divided between organized and unorganized sector Organized sector dominates juices and pulp products while unorganized sector deals in pickles and sauces 	<ul style="list-style-type: none"> World’s 2nd largest production Current processing level of around 10% High suitability for export

Segment	Market Overview	Opportunities
Dairy	<ul style="list-style-type: none"> Segment dominated by unorganized sector Cooperatives are the major players A few FMCG brands have focus in the segment 	<ul style="list-style-type: none"> India is the leading producer in the world Large production base
Fish	<ul style="list-style-type: none"> Small scale unorganized sector is dominant 	<ul style="list-style-type: none"> Third largest producer globally Second largest inland fish production globally Very high export potential
Cereals/ grains	<ul style="list-style-type: none"> market controlled by the unorganized sector 	<ul style="list-style-type: none"> 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% which is drastically low as compared to the 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.
- 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.

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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 export 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:

- A study of the currently available infrastructure in the states of Karnataka and Tamil Nadu Identifying the 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 has been conducting assimilating the data from secondary sources in the public domain and our interactions with the stakeholders in the agri export value chain such exporters, state government officials of Karnataka and Tamil Nadu, Officials of exporter associations and local officials of APEDA. Following areas of study have been scoped out under the assignment:

- Cold chain system, pre and post-harvest handling facilities, storage and processing facilities and the infrastructure facilitating value addition of the agricultural commodities in Karnataka and Tamil Nadu.
- Identifying the sea ports, ICD's, warehouses, distribution centers, quality testing infrastructure and CPC's at airport etc.
- Study of the commodities suitable for export from the two states (raw, semi processed & processed), their statewise availability and surplus volumes available for processing, value addition and export.
- Assessment of infrastructure requirements specific to Karnataka and Tamil Nadu based on the production profile and the suitability of the currently available infrastructure thereof for implementing PPP model.
- Statewise 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 Karnataka and Tamil Nadu such as certain grape varieties specific to Karnataka 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 an 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 includes 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, onion, pomegranates, cut flowers, vegetables, processed fruits and vegetables, fishes, meat and meat products, eggs tea, tobacco etc. Apart from the above commodities India also import 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 or 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.

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The following table figure gives 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

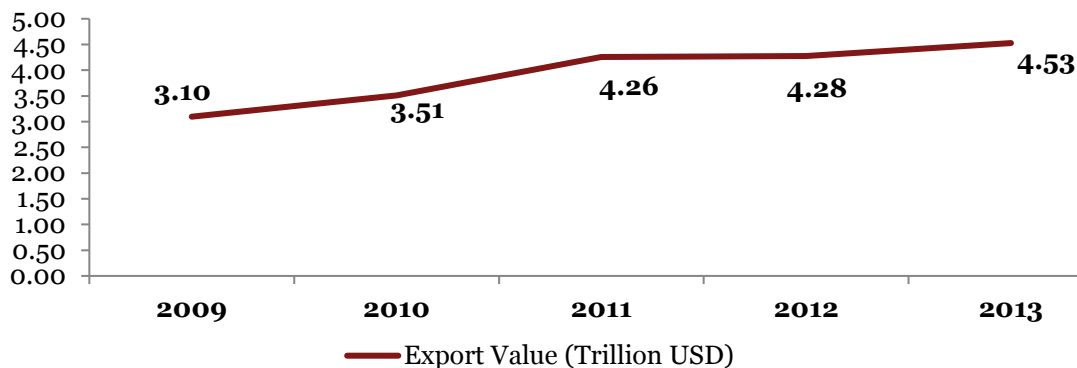
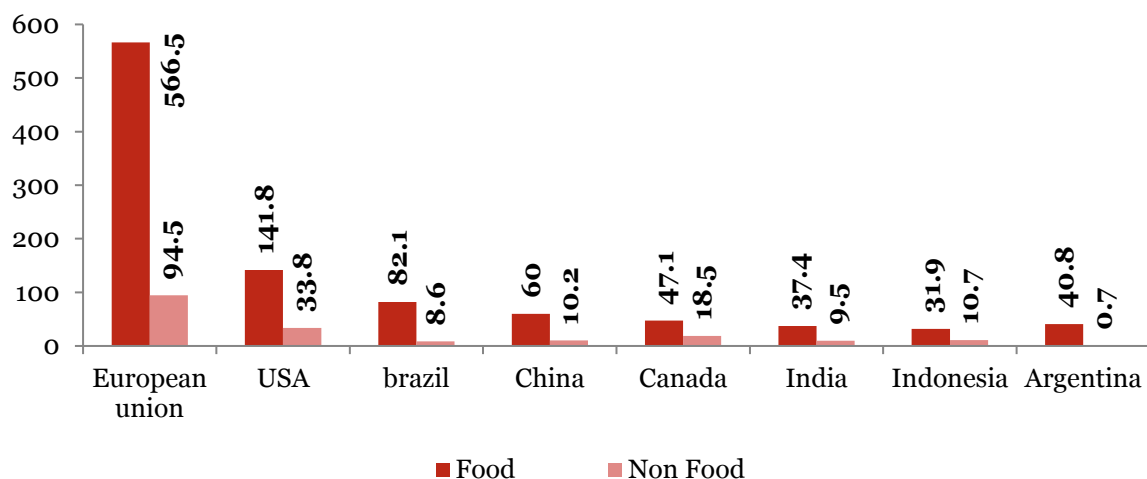


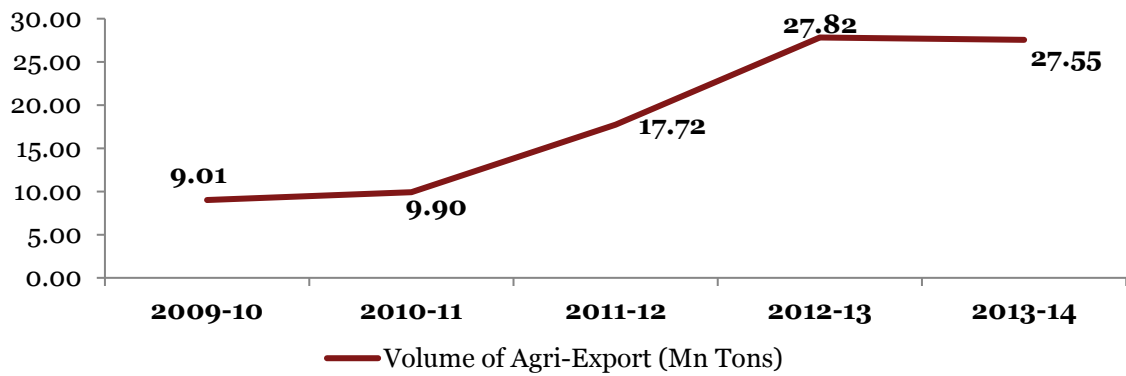
Figure 2: Major Exporter in the World (in Mn Tonnes)



Source: World trade Organization

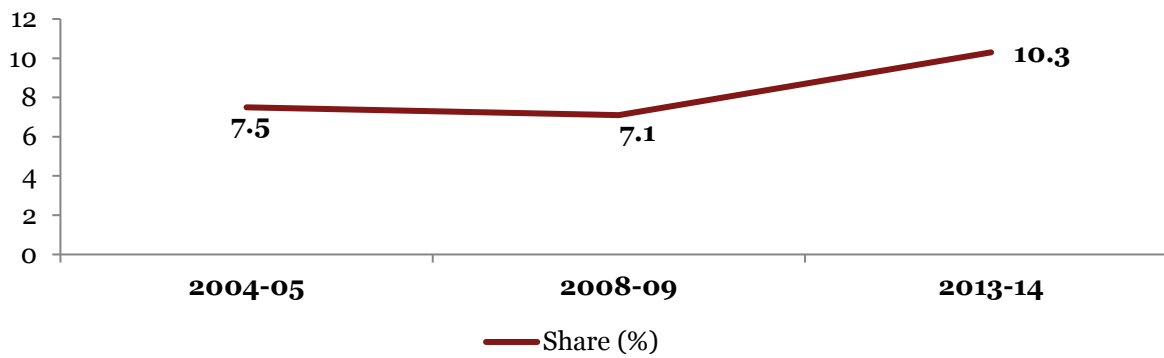
Analysis of the time series data on Indian Export reveals an increasing share of agriculture in the total exports of the country. In the past five years, agricultural export has shown a CAGR of around 32% in terms of volumes exported. However the rate of growth in the value of agricultural export from the country has slowed down. The following figures provides 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)



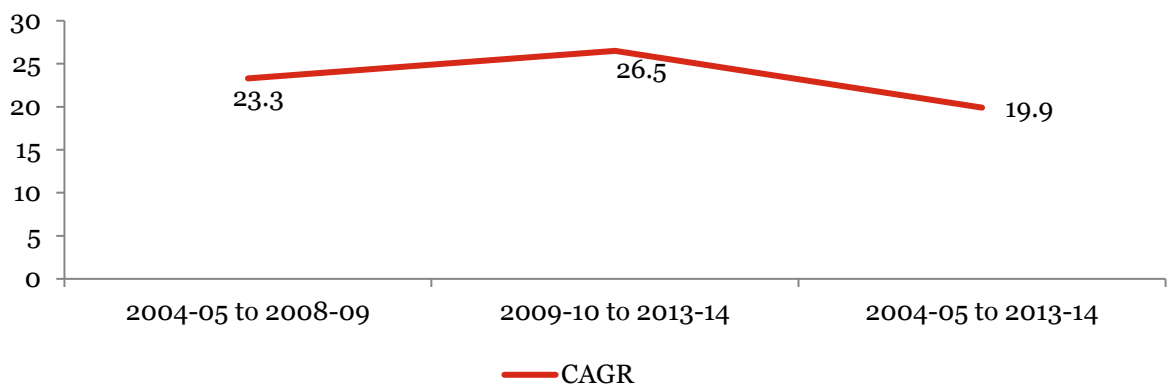
Source: APEDA Agri Exchange

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



Source: APEDA Agri Exchange

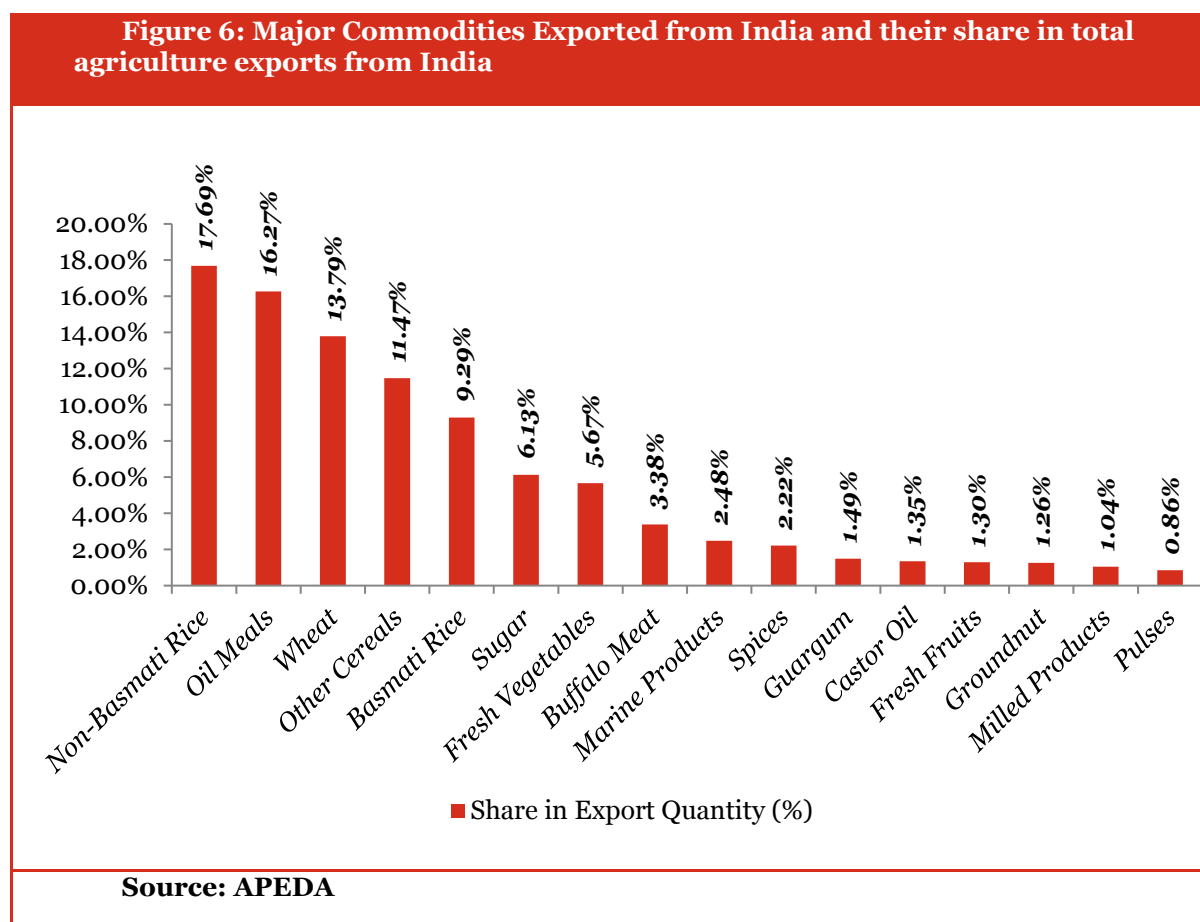
Figure 5: Growth in Agri and Allied Sector Export and CAGR



Source: Ministry of Finance, India

2.3. Major commodities exported

As per APEDA, in 2013-14 Indian agricultural export valued at around USD 39 bn ¹ (INR 2,35,988.86 crores) which shows a growth of around 16%. Rice lead 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 table gives a comparative snapshot of key commodities exported by India:



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:

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

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
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,

SN	Country	Share in the Exported Quantity (%)	Major Commodities Exported
			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
		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
Groundnut	Gujarat, Tamil Nadu, Andhra Pradesh, Rajasthan, Karnataka, Maharashtra, Madhya pradesh		
Sunflower	Karnataka		
Pulses	Madhya pradesh, Uttar Pradesh, Rajasthan, Maharashtra, Andhra Pradesh, Karnataka		

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SN	Category	Commodity	Major Producers
		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
		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 Karnataka

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

There are varied type of fruits and vegetables produced in the two states covered in this report. While this chapter focuses on Karnataka, the crop selection criteria remain the same. The crops in both states are identified on the basis of –

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

On the basis of the criterion defined above the potential crops selected from Karnataka are grapes, mango, papaya, pineapple, pomegranate, tomato, onions etc. Karnataka has considerable share in the overall production of these crops in the country and these crops also have export potential. These crops also have strong market linkages and high potential for export. Apart from these crops, livestock products like eggs and chicken meat also has the potential to be exported from the state.

The crops identified on the criteria's defined above are vetted with the exporters of agriculture commodities in the two states and verified that only these crops holds potential for exports from India.

APEDA has already identified Tumkur, Bangalore Urban, Bangalore Rural, Hassan, Kolar, Chitradurga, Dharwad and Bagalkot as cluster for Gherkins however, gherkins are exported processed and do not need infrastructure support. Therefore other clusters have been identified in the subsequent section.

3.2. Crop wise identification of the cluster and surplus available in Karnataka

3.2.1. Grapes

Grapes are one most popular fresh fruits in the world besides being used as juice, wine and resins. From the perspective of export infrastructure, the fresh produce export is what needs the maximum infrastructure. Therefore the first focus is on export of fresh grapes.

Globally the market is dominated by Chile with about 25% volume share of the total global export sales of about 4.2 million tons annually, followed by USA, Italy and South Africa. While Italy matches US in volumes, the US leads in the value terms.

In the international trade, India stands 9th with 0.15 million tons exports.

Table 4: Exporters for Fresh Grapes in the World

Rank	Area	Quantity (MMT)	Value (Mn USD)	Global Share (%)
1	Chile	1.05	246	25
2	US	0.53	127	13
3	Italy	0.5	921	9
4	S. Africa	0.32	843	8

Source: Uncomtrade

3.2.1.1. Grape export potential of India

India's grape export volume has grown from about 22,000 tons to about 140,000 tons in the last 10 years. This reflects a CAGR of about 23%. The export from India is almost entirely from the state of Maharashtra. Maharashtra produces over 80% of India's grape production.

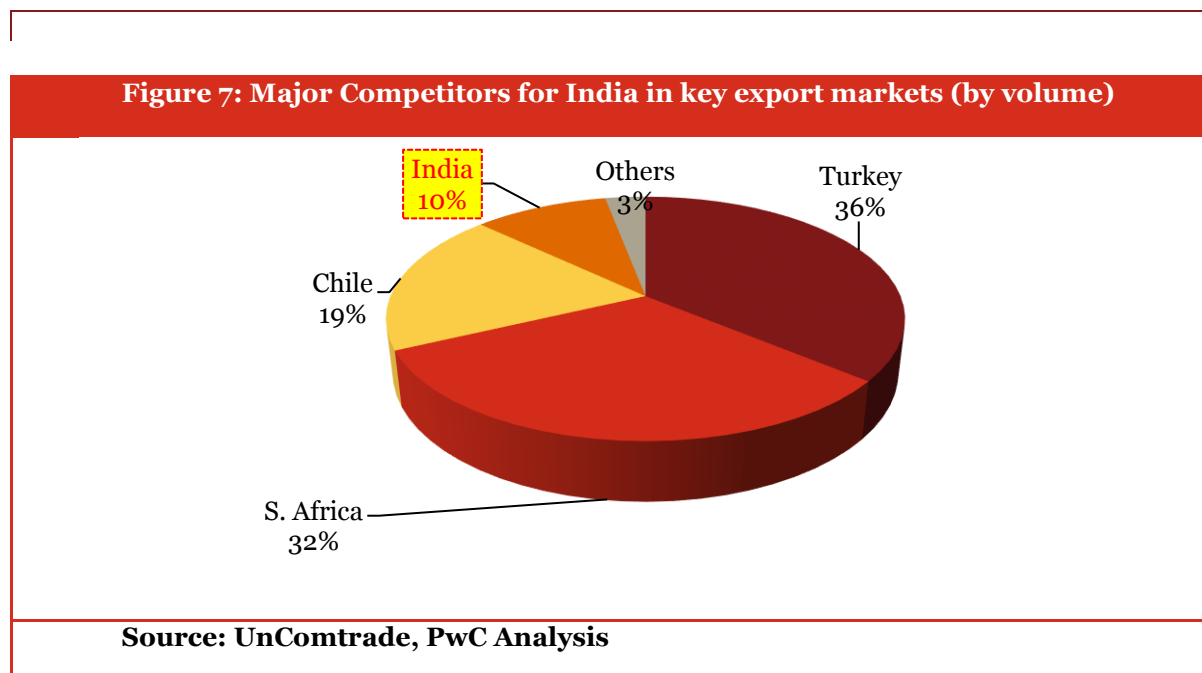
Maharashtra produces about 2.0 million tons of grapes that and exports about 6-8% of the produce as fresh grapes. The major varieties produced are Tas – A – Ganesh, Sonaka, Manik Chaman, Maruti Seedless, Sangli, Thompson Seedless, Sarita Seedless (Black Sonaka), Nanasahab Purple Seedless, Nath Jambo Seedless, Krishna Seedless, Ambe Seedless, Mahadev Seedless etc. The state is introducing international varieties. In the year 2008 – 09 four varieties viz. Autumn Seedless, Blush Seedless, Marquis and Autumn Royal were imported from Davis University, California and recently two varieties namely Victoria and Crimson Seedless were imported from South Africa.

The major varieties of Karnataka are Bangalore blue, Anab-e-shahi, Thompson Seedless, Gulabi, Arka Vathi, Shyam etc. Thompson Seedless is the largest (area under cultivation) table variety that is grown in Karnataka. It is estimated that out of the total production about 55% of the produce is of table variety while the rest are more suited for wine and juice manufacture.

3.2.1.2. Analysis of exports from India

As discussed earlier, the presence of India in the international market with volume share of 3.5% in the global trade while about 2.5% in value share. Production wise as well India contributes, 3-4% of the global production. So this is one of the very few crops where India's export performance is commensurate with its production performance.

The top destinations for Indian exports are Netherlands, Bangladesh, Russian Federation, UK, UAE and Saudi Arabia; together they constitute 80% of India's export. However, India's position within these markets (taken together) is not very strong. India is in 4th largest exporter with only 10% market share.

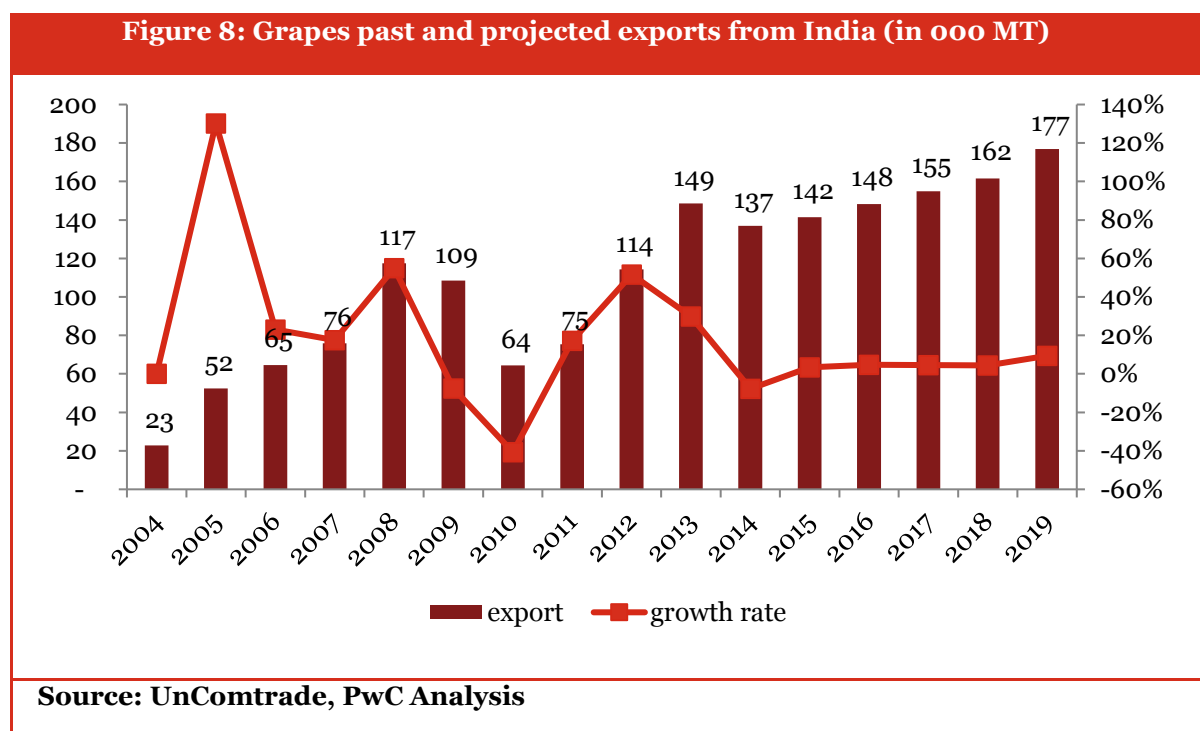


Grape Seasons in India and the competing countries

The harvest time difference is a major creator of opportunity for the fresh fruit supplying country and so is the case with Grapes –

Chile and India the harvest time is February to April while in South Africa the harvest period is December to February (for Thompson Seedless) and the harvest season in Turkey is between August and October. In order to capture market share we need to add varieties that can be counter cyclical to our usual harvest season. A case in the point - Maharashtra has imported Crimson Seedless from South Africa and trying to develop the same. Interestingly, in South Africa the Crimson Seedless is a grape which is harvested for 2 months after the Thompson Seedless harvesting is over.

3.2.1.3. Projection of Exports



Step 1 – Projecting India’s export over next 5 years based on last 10 years’ performance - Based on the last 10 years’ export performance, if the export potential is projected (using the least square method) then it can be expected that the total exports should reach the 175,000 tons by 2019. The key question is how much of this export can be achieved by Karnataka. However it may be noted that as DGCIS records, India’s export is about 192,000 tons in 2014, a year which is not covered by the international data base of UNcomtrade. Considering this information the projected export should be about 222,000 MT. The projection graph is not being changed because firstly the DGCIS data cannot be combined without homogenization and secondly even if the data is included the incremental increase in exports remains confined in the 26000-30,000 MT over the next 5 years. So the infrastructure need over the next 5 years remains the same. With this understanding we proceed to define the potential for Karnataka

Step 2 – How much of India’s export will come from Karnataka – Karnataka has a production base of 0.3 to 0.35 million tons of grapes while Maharashtra has a production base of 2 million tons. Currently, Maharashtra exports about 7% of its production. In order to match the same level of exports Karnataka should be able to export about 15,000 to 20,000 tons per annum over a production base of 300,000 tons.

Step 3 – Is this estimation reasonable – Currently Maharashtra is the only major exporter of Grapes from India with export volumes of 0.15 million tons. We assume that the overall export from India is likely to cross 0.175 million tons by 2019 at a conservative growth rate of around 5%. Further considering the current production levels we can safely assume that the additional growth of 0.025 million tons will be contributed by key production states of Maharashtra (10000 tons) and Karnataka (15000 tons).

Since the current level of export is negligible, the forecast of 15000 tons i.e. 1000 containers may appear very high. However, Karnataka gaining 15000-20000 tons of export is reasonable because of the following reasons:

- being a neighboring state, Karnataka gives a good diversification option to the export traders from Maharashtra, if the support infrastructure is in place
- this is the potential to be achieved in 5 years and

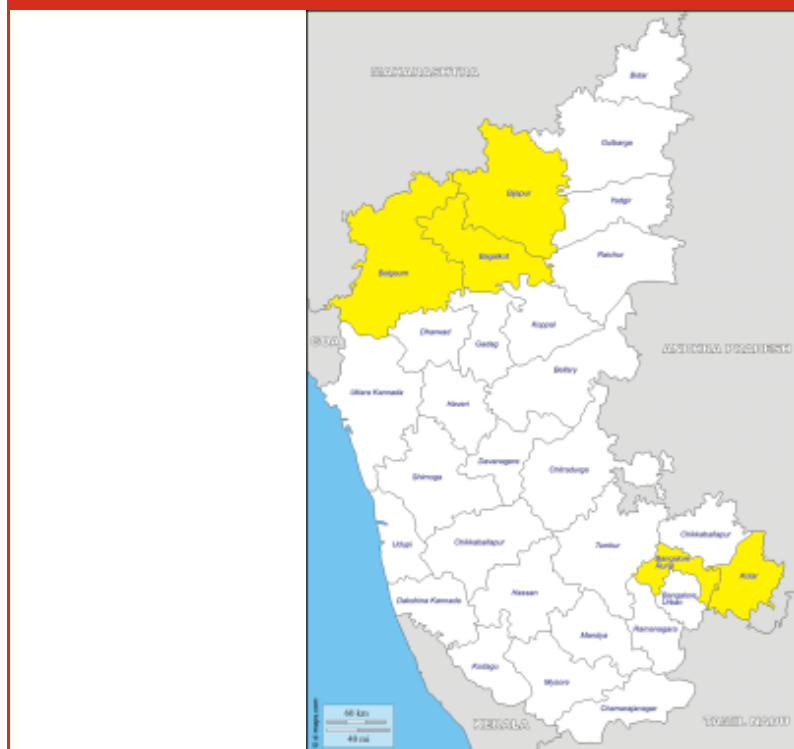
- many crops in recent years have achieved over 100% volume growths so if the circumstances are right this growth can be achieved in one season

The major production zones for grapes in Karnataka are Bijapur, Bagalkote and Belgaum in the north and Bangalore (Rural) and Kolar in the south. In order to process the exports, two pack houses are needed i.e. one each in both the clusters. The two pack houses need to have capacity to process 10,000 tons within the 4 months of February to April that implies the need for an 80 -100 ton (installed capacity/day) pack house.

Further, In order to achieve this target, infrastructure development has to be supported through measures such as introducing of internationally popular grape varieties; farmers' capacity building, GAP certifications and active promotional support during the first 5-6 years in order to build the volumes.

In addition there exists potential for resins, juices and wines in Bangalore as there are quite a few varieties in Karnataka which are suitable for the juices and wines. Bangalore Blues is a variety for which geographical identifier (GI) has also been issued. The processing of grapes does not require post-harvest infrastructure.

Figure 9: Major Production cluster of grapes in Karnataka



Source: Indiatat, PwC Analysis

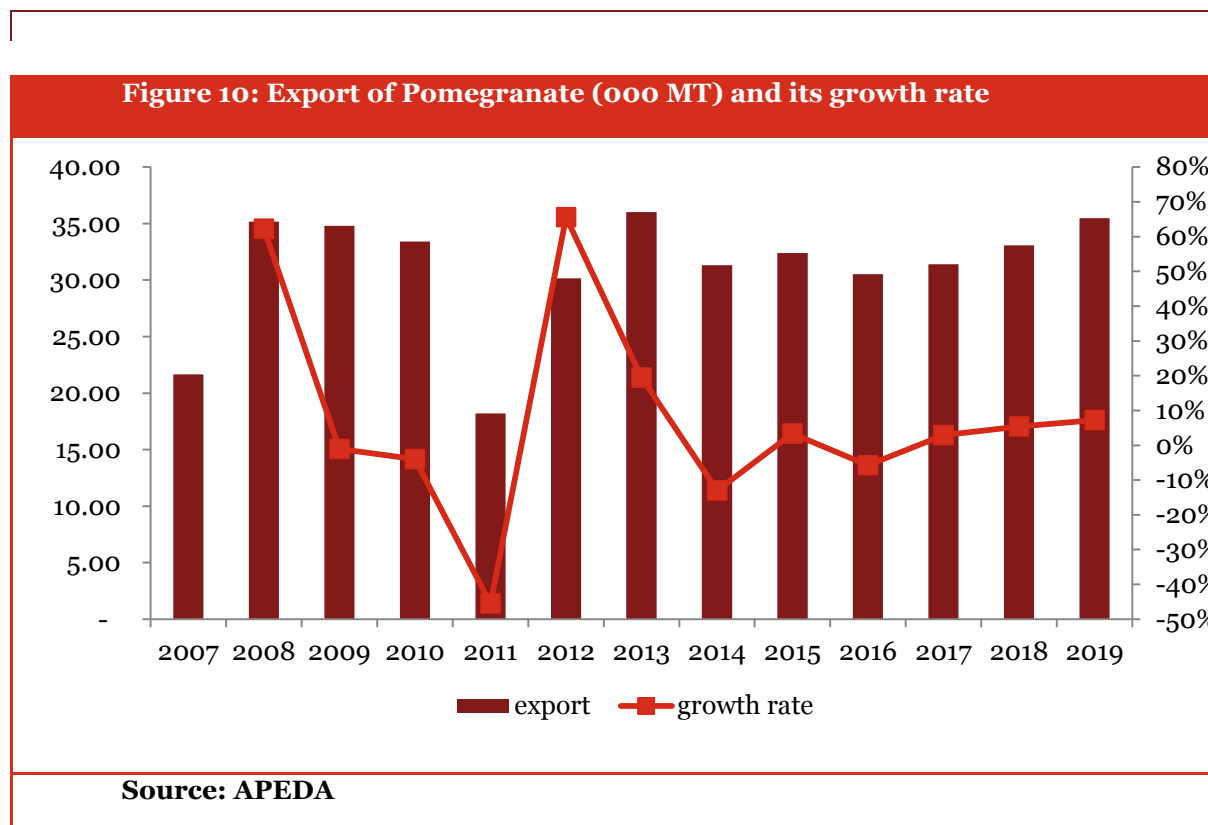
3.2.2. Pomegranate

This is a crop for which international trade data is very limited. The reason for limited information is the concentrated production in India and Iran. It is a crop that is native of Iran and is well suited for growing in dry / low rainfall conditions. Therefore the crop was found suitable in many regions of India.

India currently produces 1.35 million tons of pomegranates from 130,000 hectares of land. Further, India exports little over 2% of its production in the international market. Indian varieties are internationally acceptable as long as the size requirements are met. The shelf life of the fruit is about 7 days ambient and 10-15 days in cold chain.

3.2.2.1. Projection of Exports

Step – 1 forecasting the exports of India - Since global trade in pomegranates is not recorded; therefore an assessment of the market is limited forecasting exports from India only. India's exports have also grown at sluggish CAGR of 5% over the past 7 years. And a linear progression (least square method) of the existing trade will only increase the export to 35000 tons from the current level of 31000 tons. This is demonstrated through the graph below.



As can be observed, the exports has always been range bound between 30,000 and 35000 tons, while during this period the national production has increased from 0.8 million tons in 2008 to about 1.3 million tons in 2014. This shows a clear trend that production increase will not increase international trade unless supported by suitable infrastructure and export focused cultivation is done through development of international cultivars.

Step 2 – Moderation of the forecast - So going forward and planning the investments in the infrastructure we assume that the addition of infrastructure will increase the export by an additional 20% thereby increasing export of pomegranate to 42000 tons from a current level of 31000 tons. This assumption is not mathematical; instead it is based on stakeholder discussions.

Step 3 – Karnataka’s Share in the export – The production of the pomegranates in Maharashtra is about 0.9 million tons while Karnataka has 0.13 million tons and between these two states, 80% of the pomegranate production in India is covered. If the projected export of 42000 tons is allocated to these states in proportion of their production then Maharashtra can be expected to export 37000 tons and Karnataka can be expected to export 5000 tons.

The season for the crop is June to October and the major regions in Karnataka are Gulbarga, Raichur, Koppal, Bijapur, Bagalkot, Bellary, Davangere, Belgaum and Chitradurga. This region has an overlap with the Grape growing zones in North Karnataka and the season is also complementary therefore there is opportunity for having shared infrastructure. In one of the major districts Bijapur, Bagalkot and Koppal are centers for exports and we would set up multi product pack house for grapes and pomegranates.

3.2.3. Papaya

Papaya is a tropical fruit originating from Latin America but at present India is the largest producer of Papaya in the world with nearly 40% of the production of the world is in India. However, India has only about 6% market share in volume terms and about 4% in value terms. The problem with this fruit is its low shelf life (2-5 days) and therefore difficulty in sending over long distances. The largest importer of this fruit is USA accounting for 50-60% of the import. Given the short shelf life, even the second largest producer, Brazil does not supply to the US market. This market is dominated by Mexico.

Table 5: Exporters for Papaya in the World

Rank	Area	Quantity (MMT)	Value (USD)	(Mn)	Global Share (%)
1	Mexico	0.12	67		39%
2	Guatemala	0.03	12		11%
3	Brazil	0.03	42		10%
4	Belize	0.03	10		9%

Source: FAOSTAT (MMT= Million Metric Tons)

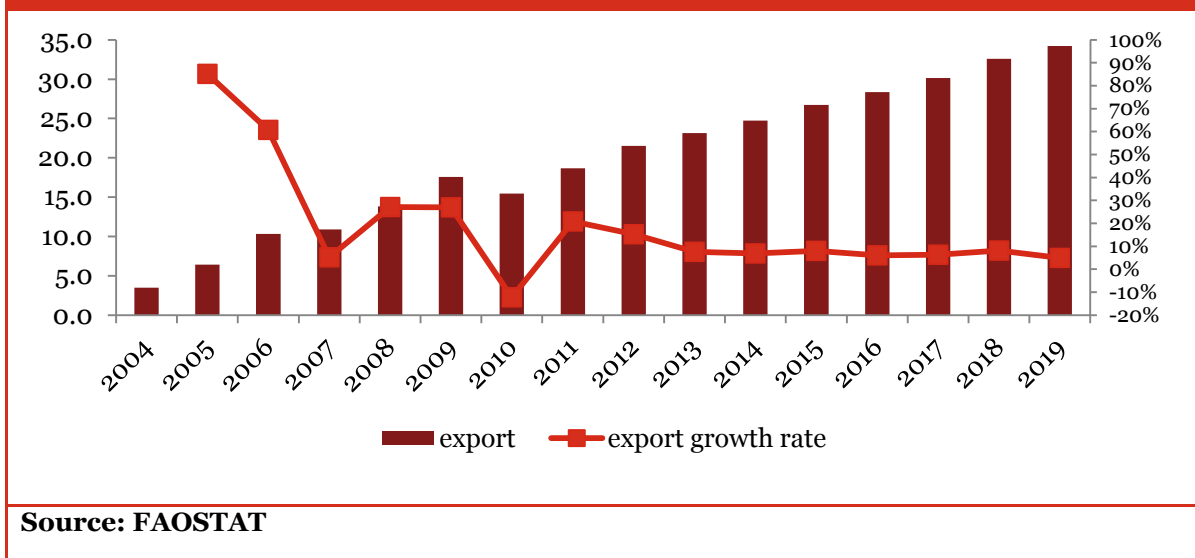
Nepal (60%), Saudi Arabia (33%), Kuwait (5%), France(1%) (#) are the major international markets for exported Indian Papayas. Within these key export markets, India is ranked among the highest. In Nepal India has 100% market share of the import of Papaya, while in Middle-east, the share of Indian exports is close to 80%.

US, Singapore, Canada, El-Salvador & Netherlands are the major importers of papayas, India’s share of exports to these countries has been miniscule. Proximity to major exporters, variety preference and perishability of the produce might be major reasons for the same.

While US, Canada, El-Salvador are currently impossible to cater to, Singapore market could have been considered for development. That market imports about 20,000 tons per annum and India could have targeted a 20-25% market share in this region. However even the Singapore market is not available. This is due their close proximity to Malaysia which is the primary suppliers for Singapore.

3.2.3.1. Projection of Exports

Figure 12: India’s export performance over the years and the projected exports based on linear forecasting



Source: FAOSTAT

Papaya export shows a growth trend of about CAGR of 26% since 2004. This is a very strong performance for a crop. Going forward the analysis throws up a modest growth rate of about 6%.

However this leads to a growth of about 15000 tons by the end of 2019. This as an absolute number is unreasonable because there are limitations to the number of markets that can be serviced from India and the markets which can support this level of growth. The current level of growth is supported largely growth in the import markets of middle- east. However these markets have grown erratically.

Based on the above information we make the following assumptions –

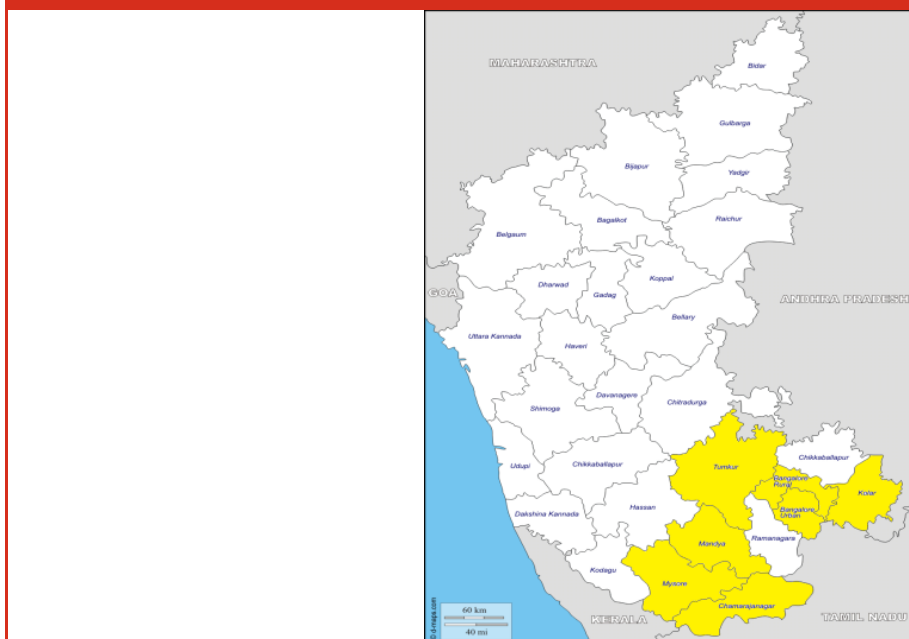
1. The growth in Papaya export will be small and assume that it will be only 0.1% (due to saturated primary markets and low shelf life) of the production of India (5.2 million) i.e. a growth of 5000 tons only
2. The growth will come from Middle-Eastern markets only
3. Since Karnataka and Maharashtra are the largest producer states in the west coast, the entire export will be provided by these 2 states.
4. Since Maharashtra’s production is over 3 time Karnataka’s production, therefore it is safe to assume that of the projected export of about 20,000 tons, ³/₄ quantity is export is from Maharashtra and ¹/₄ is from Karnataka.

Based on these assumptions, it is projected that the export of Papaya from Karnataka is about 5000 tons only.

The cluster to be covered consists of the following districts Bangalore Rural, Kolar, Tumkur, Mandya and Mysore. The required pack house will be in an area which will be common to grapes and other vegetables and therefore it is possible to a multi commodity pack house facility.

In addition to fresh papaya exports limited quantities of papaya pulp can also be exported. A more significant category papaya based product is Pepin based enzymes. These are high value added products but do not occur on the APEDA list of products.

Figure 13: Major Papaya production centers in Karnataka



Source: Indiastat, PwC Analysis

3.2.4. Assorted Vegetables and Fruits

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 crops. 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.

Karnataka is ranked 10th in terms of the total vegetable production in the country. The major vegetable crops of Tamil Nadu are tapioca, onion, tomato, brinjal, okara, gourds, cabbage and drum sticks. Tamil Nadu is also known for the exports of tropical vegetables from the state. The tropical vegetables like drum sticks, lady fingers, bottle gourd, snake gourd, bitter gourd, snake gourd etc. the export these tropical vegetables are taking place majorly from Chennai and Cochin airports. These terminals generally export vegetables to countries like UAE, Saudi Arabia, Kuwait and other Middle East countries.

There are small amounts of various tropical vegetables being exported by air to various 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.

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

These crops are –

1. Gourds – bottle gourds, bitter gourds, snake gourds
2. Drum sticks
3. Curry leaves
4. Beans (French, Chikdi, Cluster beans)
5. Brinjals
6. Cucumber
7. Ginger
8. Chilli
9. Elephant Yam
10. Coccinia
11. Peas
12. Okra
13. Garlic
14. Papaya
15. Pomegranate
16. Banana

3.2.4.1. Projection of Exports

Table 6: 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 from Bangalore Airport and are done so with the use of any cold chain. They crops are procured in the morning from markets and regions not too far from Bangalore. 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 Bangalore would be most suitable location for setting up a pack house for these assorted commodities.

So the pack house in Bangalore for assorted vegetables and fruits would require an annual through put capacity of about 7000 tons by 2017.

It must be noted that export of such assorted vegetables and fruits should not be compared at a national scale. These exports typically cover produce that can be procured, graded, sorted, palletized and air shipped within 1 day. Therefore the focus is only on locally available produce, highly seasonal and bears little correlation with similar export happening in the rest of the country.

3.2.5. Tomato

This is one of the most widely grown crops in the world and there exist many varieties across the world developed to suit the local tastes preferences and to resist the local weather and disease shocks. India is the second largest producer with 11% share of the global production. China is the largest producer with over 30% share of production.

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3.2.5.1. Projection of Exports

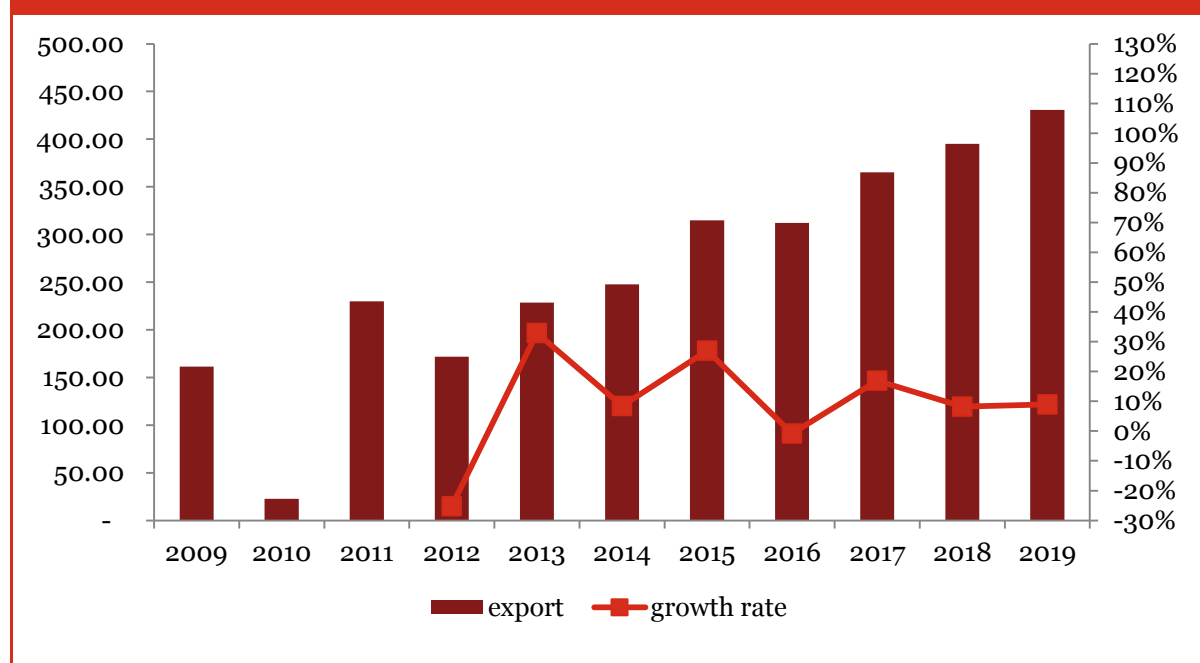
The global trade in tomato is about 7.2 million tons, while India has a miniscule share of about 0.25 million tons. So in volume its 3% while the production is about 11% of the world. So prima facie there seems potential to substantially increase exports. It has medium shelf life of upto 10 days in cold conditions and also has good life in ambient conditions as well.

India’s current tomato exports –

Pakistan (94%), Nepal (3%) constitutes India’s major tomato market accounting as much as 97% of India’s export. In these countries India has almost 100% market share in their entire tomato import bill. Therefore in order to increase the export of tomatoes then the traditional markets of Pakistan and Nepal.

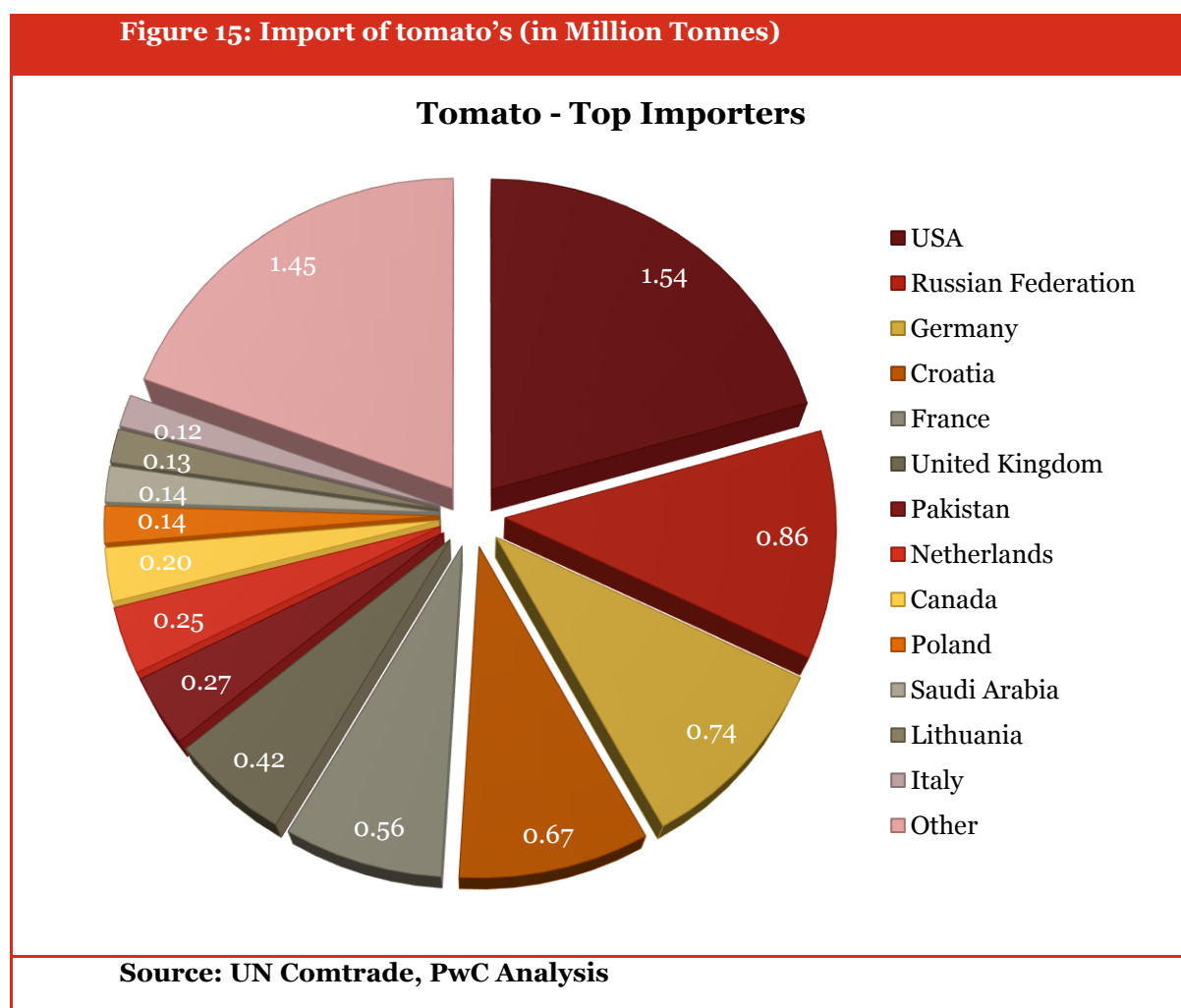
Step 1 – Projecting Exports –If we assess the trade volume growth in the past few (though it has been achieved by creating dominance in a few markets only) and forecast the volume potential after 5 years, it can be observed that the current growth momentum shows that achieving 425,000 ton of exports should be feasible. This appears to be too high but this not a projection of exports, it is export “target” for the crop. In order to achieve this growth target India needs to target new markets.

Figure 14: Export and growth rate of tomato from India



Source: UN Comtrade, PwC Analysis

Step 2 – Assessing feasibility of projected exports - New markets need to be explored in order to achieve significant growth in exports along with building the back end infrastructure. So let’s consider the potential markets to target –



These markets together constitute 80% of the importers of tomato. Even after excluding Pakistan (because India is the dominant exporter there) and USA, which due to the distance may be difficult to serve, the remaining market is about 4 million tons per annum. Through organised and focused effort achieving 175,000 tons export growth in a 4 million ton market is quite feasible.

Step 3 - Assessing share of Karnataka in the export growth - It is assumed that the top 3 states (in terms of production) share 90% of the export i.e. 387,000 tons should be exported by the top 3. These states are Andhra Pradesh (3.3 million tons production), Karnataka (2 million ton production) and Madhya Pradesh (1.9 million ton production) and the export should be achieved in the ratio of their production. This implies that Karnataka should be exporting about 108,000 tons. However since Karnataka is currently a exporting only a negligible amount of produce. Therefore it is assumed that Karnataka on a conservative basis should target to achieve at least half of its potential i.e. 54000 tons (2.5 % of current production level) of exports in 5 years.

In order to achieve this target, a focused and planned approach is needed on the part of Karnataka and APEDA will have to provide extensive hand holding and capacity building support. This has to be taken up in a project approach with a pilot stage, where in varieties are tested as shipments of existing varieties are tested in new markets. Thereafter the scaling plan should be put into place and partnerships created

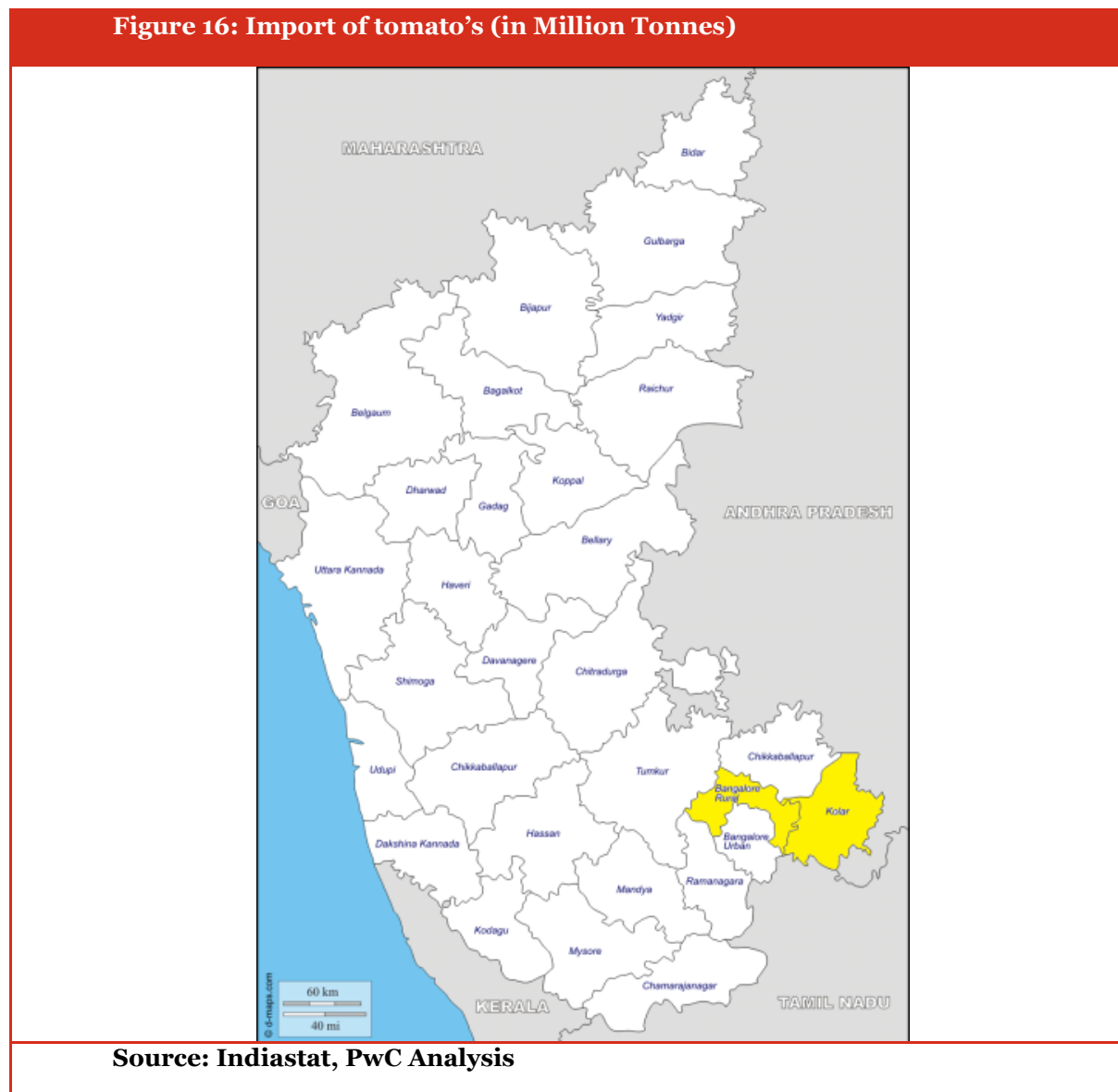
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with suitable large international and national players as well as with various state level government bodies. Developing large base of GAP certified farmers.

In addition to fresh produce export, private sector should be motivated to develop tomato paste, flavors, soup mixes and ketchup etc.

Target Locations for Tomato Clusters –

The major production districts are in the southern cluster covering Kolar and to some extent Bangalore Rural and nearby regions.

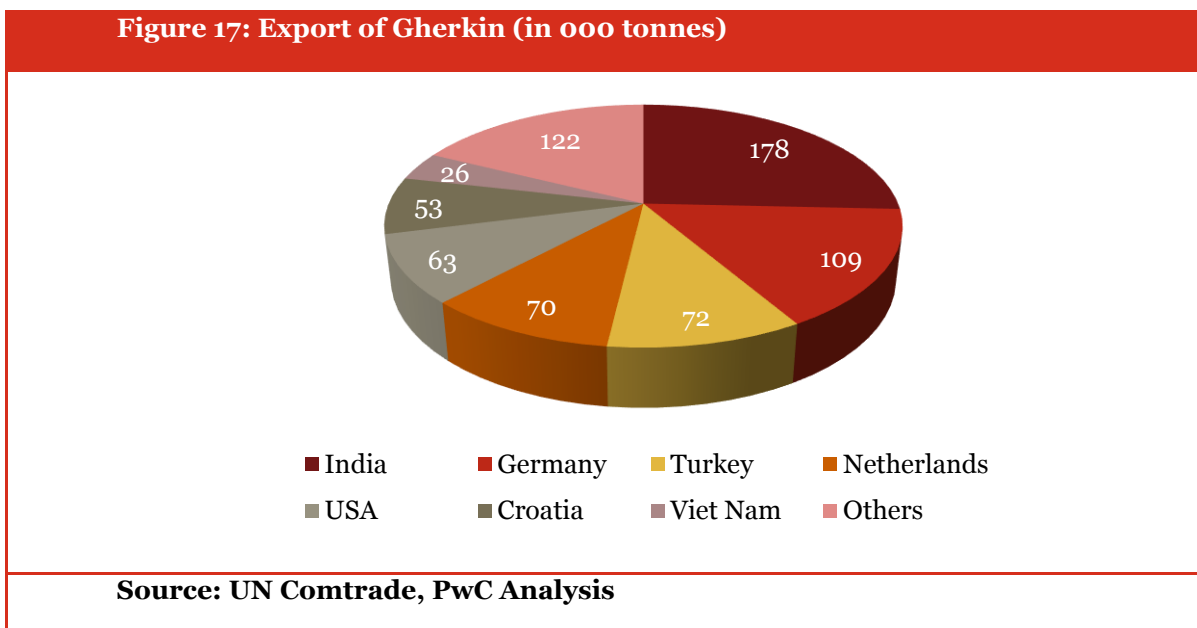


3.2.6. Cucumbers/Gherkins

India is the largest exporters of Gherkins in the world and almost the entire of the production is in the state of Karnataka. This was a unique crop at the time of its introduction because the product had no market whatsoever in India. So the farmers growing this product were taking the risk that if the product did not sell, there would be not alternative revenue. The other issue of such a crop is price discovery. Since there was no open market with multiple buyers and sellers, prices would always be negotiated. Such a situation can be common in an industrial setting but in agriculture this was certainly a challenge. So this is one of the very few examples in the country farmers has grown what the end user wants and trying to sell whatever he is producing.

This approach is needed for other crops as well particularly where the domestic market is already quite established e.g. cultivation of rose onions in Karnataka even when there is a strong domestic market already. The approach for assessing the export growth potential for Gherkin would be to assess the growth of exports and growth of international market and assume that lower of the growth rates would be applicable to Gherkin export from India.

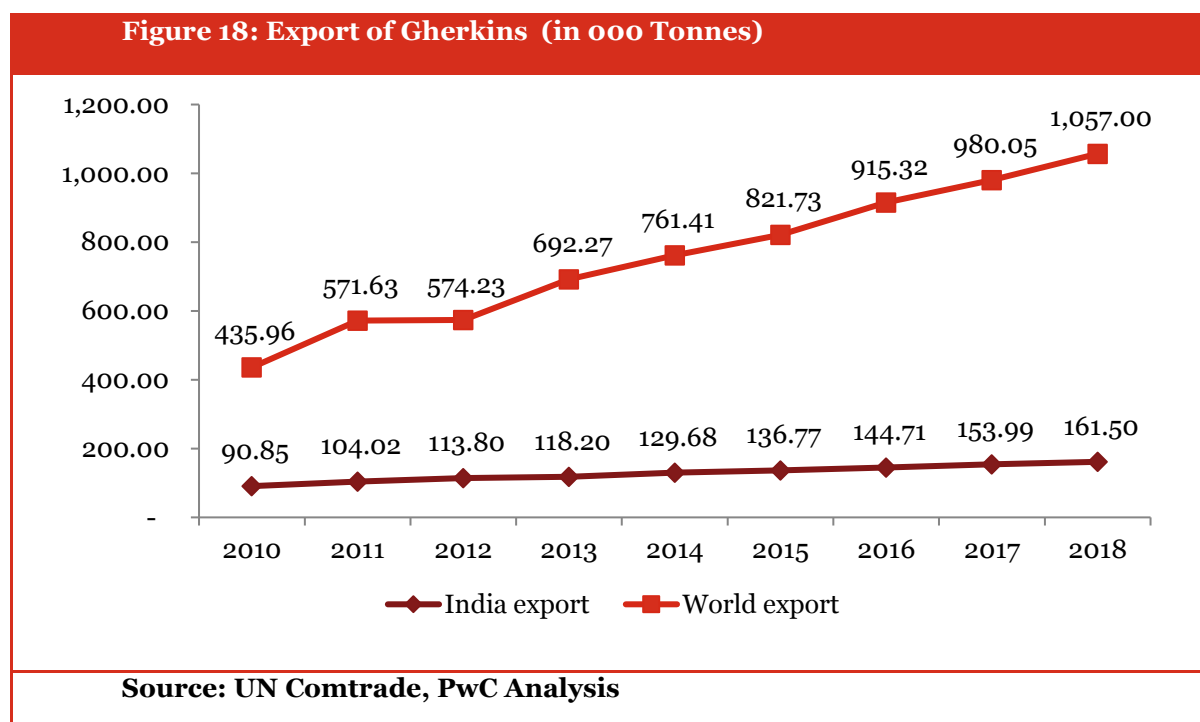
Figure 17: Export of Gherkin (in 000 tonnes)



Source: UN Comtrade, PwC Analysis

The entire production of Karnataka is geared towards export trade. While other cucurbits are harvested in large quantities for the domestic market itself, this is not a product for domestic consumption. Therefore whatever is produced is exported. The growth will be driven by external factors.

3.2.6.1. Projection of Exports



Based on the past performance of the global market, the past performance of the Indian exporters it can be projected through linear progression that export volume would increase to about 200,000 tons. Exporters of Gherkin have informed that physical infrastructure is not currently needed, but the area of focus should be development of planting material. As of now planting material is imported and expensive. Local agriculture research center had so far avoided pursuing research on gherkins because it is not a critical crop for India. APEDA may use its good office to influence the inclusion of crops of export importance into the research programmes.

3.2.7. Pineapple

Like almost all other crops, India is exporting well below its potential in pineapples as well. Pineapple production in India is 6-7% of the global production however our share in the global market is negligible at about 0.07%. Compared to our production, the export is almost 0%.

The bulk of the international demand is currently being met by the South and Central American countries. However, their seasons end in February and we can exploit the season after that because in India some states have very long seasons (up to 9 month including lean season for West Bengal).

Karnataka as a pineapple growing state has an advantage in catering to the western markets because the eastern sector of West Bengal, Assam and Bihar have much larger production bases and currently the hubs for bulk of the international trade for fresh, canned and juiced products.

In catering to the western market, the assessment export potential will be based on production available instead of existing exports, because existing exports are negligible. Pineapple has 7-10 days in ambient conditions and upto 15 days in cold store. The most popular commercial pineapple variety in India is Giant Kew. Other important varieties are Queen, Kew, Mauritius, Charlotte, Rothchild, Jaldhup, Desi, Lakhat, etc. For the purpose of exports the Md2 varieties need to be used and they are currently available in India.

3.2.7.1. Projection of Exports

Step 1 – Assessing the international market - The international market is dominated by Latin America with Costa Rica alone exporting 1.9 million tons of the total global trade of 3.3 million tons. The products movement is defined by seasonal availability of the crop. Therefore the opportunities lie in producing off season. The other opportunity is in environmental sustainability. With almost 2/3rd of the world's and 3/4th of Europe pineapple coming from Costa Rica, a major area of concern is the industrial production systems of Costa Rica which is heavily pesticide and fertilizer dependent.

Following graphs represent a break-up of the various market zones. All zone can be considered because pineapple is a crop that be transported over longer distances.

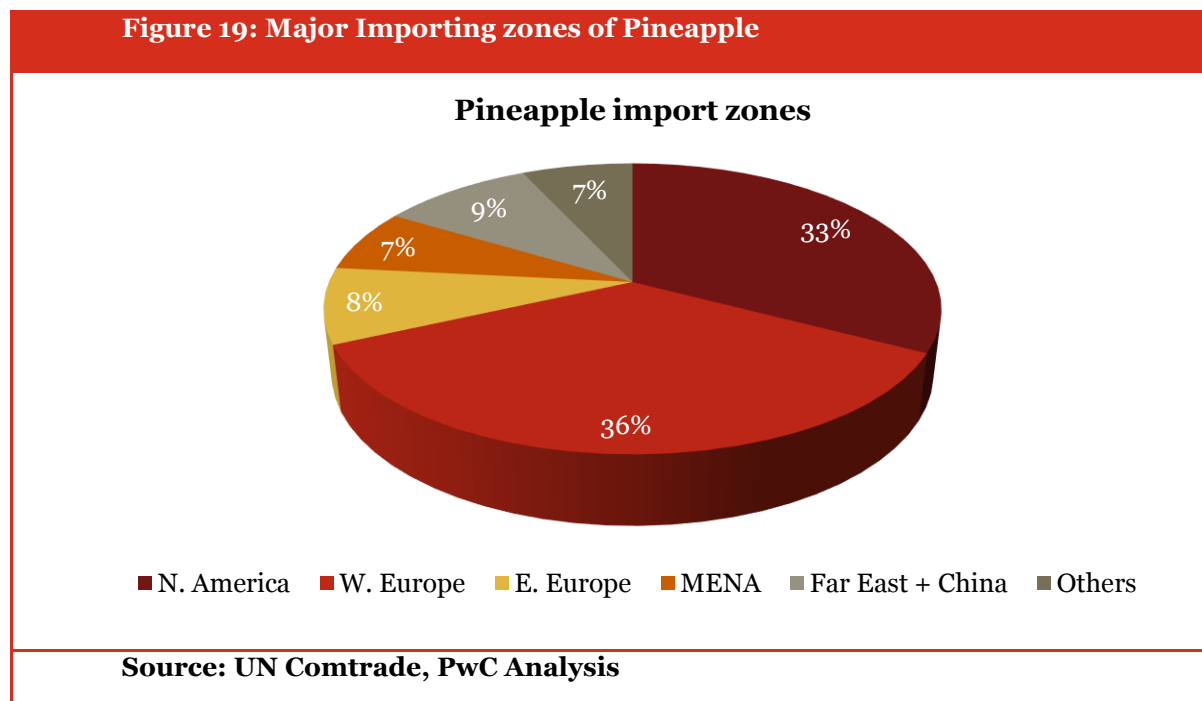
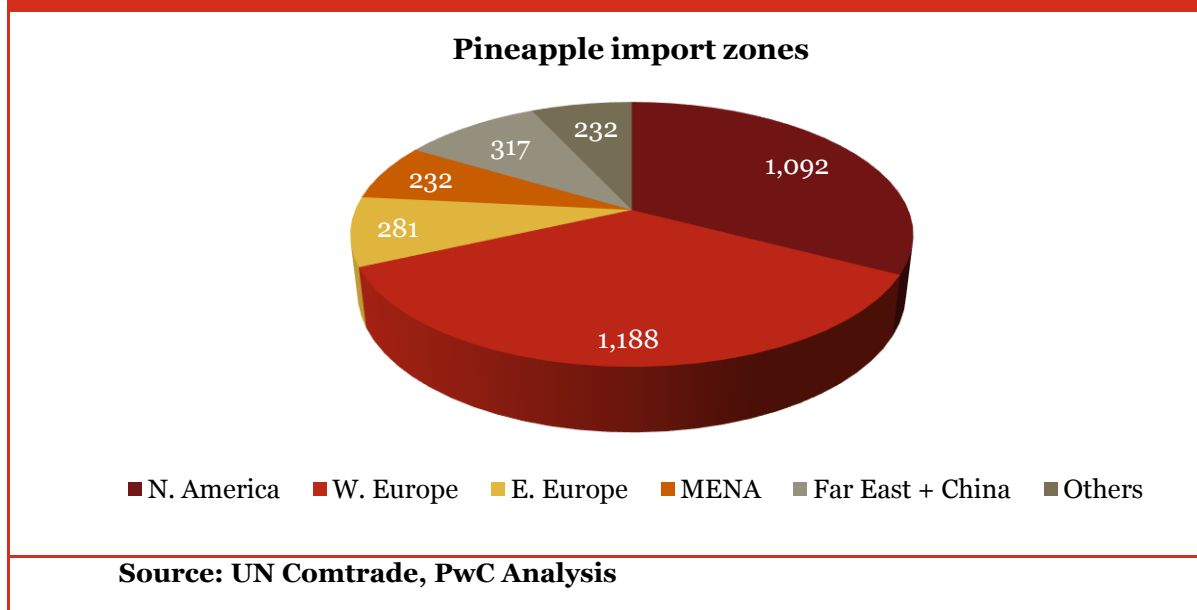


Figure 20: Major Importing zones of Pineapple(000 tons)



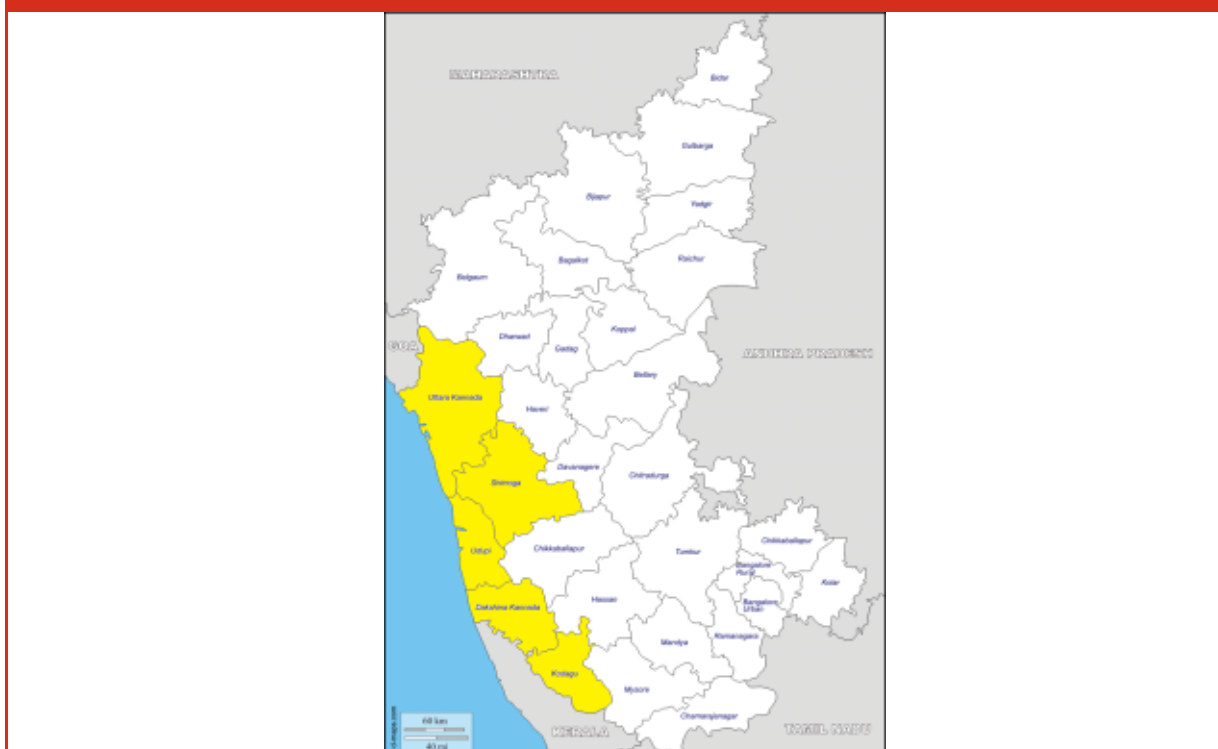
Source: UN Comtrade, PwC Analysis

Step – 2 – Developing the export potential for Karnataka pineapples (instead of projecting for India and allocating a share to Karnataka) for developing Pineapple exports from Karnataka (which currently happens in small quantities with other fruits and vegetables) the regions that should be considered are MENA (Middle East and North Africa), Eastern and Western Europe. This approach of focusing on directly on projecting for Karnataka instead of India first and then Karnataka is adopted because unlike the other major crops of Karnataka, the domestic competition in Pineapples is not from the neighboring states but from the Eastern Indian states which have different crop cycles, varietal characteristics and value chain dynamics. Therefore clubbing Karnataka with rest of India is not advisable.

The total volume of imports in MENA, Eastern Europe and Western Europe are 0.2 million tons, 0.3 million tons and 1.2 million tons respectively. Over the next 5 year period targeting 3% of the MENA market and 0.5% of total European market would be reasonable and achievable.

This brings to target export volume of 13500 tons exports from Karnataka in 5 years’ time which can be catered to by 160,000 ton of current production. The relevant regions in Karnataka are Shimoga, Kodagu, Uttar Kannada, Dakshin Kannada, Udupi.

Figure 21: Major Production zones of Pineapple



Source: UN Comtrade, PwC Analysis

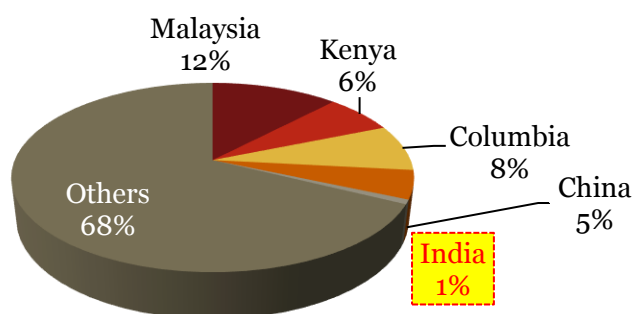
3.2.8. Floriculture

Floriculture export i.e. exports of cut flowers, loose flowers and dried flowers, has been traditionally seen as a prestigious business segment but when the global trade is considered is when the stark difference is noticeable. In a global trade of 9.5 billion US\$, India has exports to the tune of US\$ 75 (approx INR 450 crores) which is less than 1%.

3.2.8.1. Projection of Exports

Step 1 – Assessing the international market – The countries where India exports are USA, Germany, U K, Netherland, UAE, Singapore, Japan, Italy, Canada, Poland, France and Spain are the major international markets for flowers/floriculture products from India and even in these markets India’s total market share was only 1% and there is strong competition from Malaysia, Columbia, Kenya, Thailand & Republic of Korea.

Figure 22: Major Competitors for India in Key Export Markets (by Volume)



Source: UN Comtrade, PwC Analysis

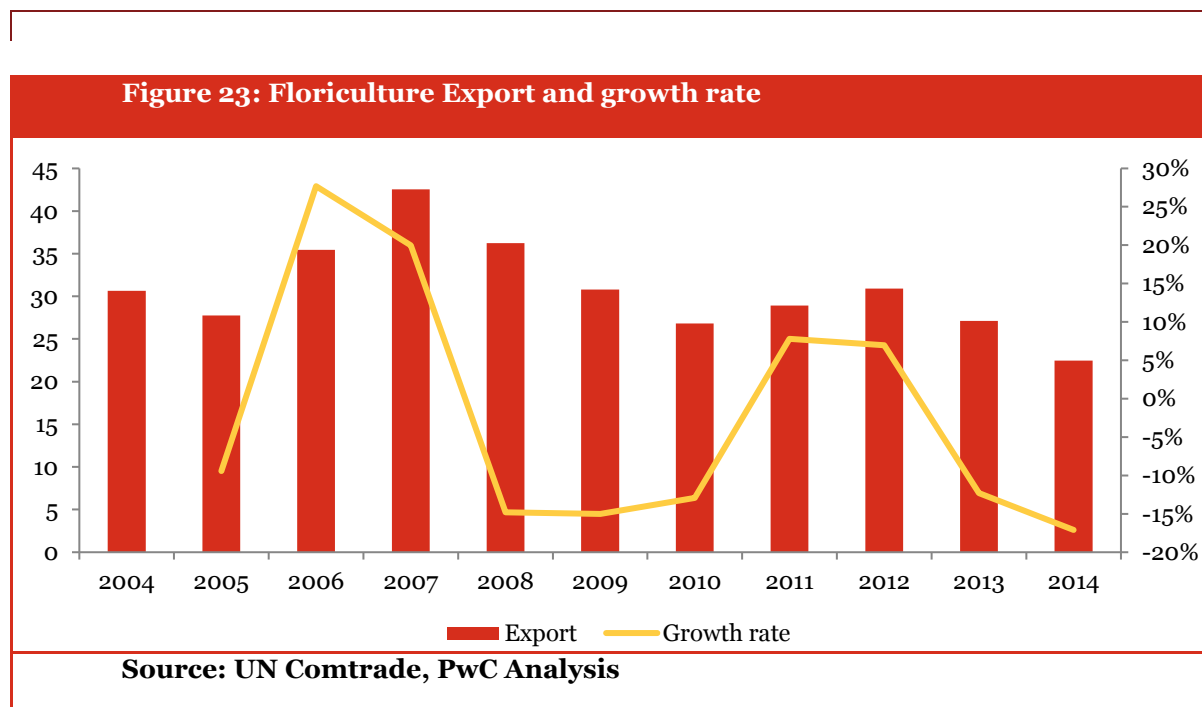
In the international market the dominant player is Netherlands which controls over 50% of the trade, followed by Latin American and African countries.

Table 7: Top flower exporters in the World

Rank	Area	Quantity (MMT)	Value USD (Mn)	Global Share (%)
1	Netherlands	0.51	4640	51%
2	Colombia	0.21	1335	11%
3	Ecuador	0.16	837	8%
4	Ethiopia	0.13	527	7%

Source: UNComtrade

Step 2 – India’s Export performance - Not only India has low market share in the international market, the export in volume terms has been declining over the past decade. The volume of export has come down from ~31000 MT to ~22000 MT resulting in a CAGR of -3.1%. Projecting the export sales through least square method will lead to a negative forecast which we believe may be too conservative when planning for future infrastructure requirements. So for floriculture this forecast will not be taken into consideration.

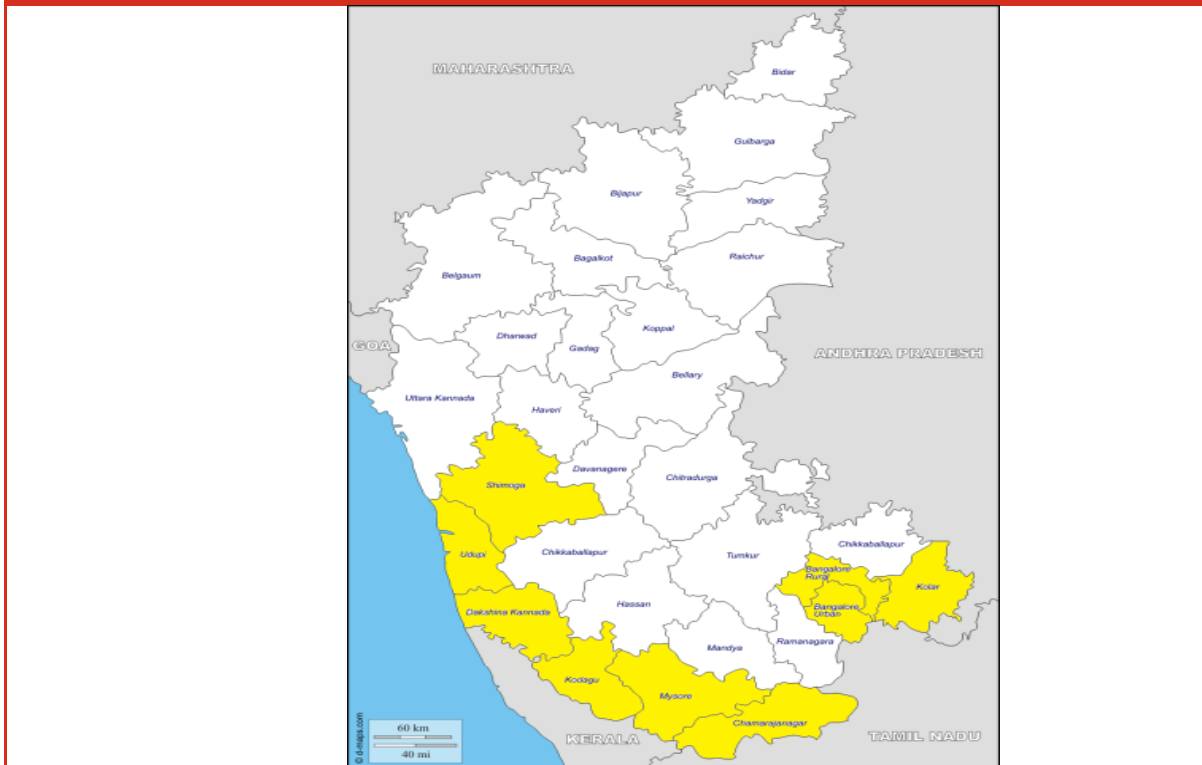


Step 2 – Assessing Karnataka’s export potential directly – Karnataka’s share in exports in volume terms is 7% while in value terms it is 11% while it is not possible to separate loose flower exports and cut flower exports as they are not tracked accordingly. This volume allocation to Karnataka is based on the assumption that given the perishable nature of flowers, they exported from the nearest airport. So all the export from a particular airport is allocated to that very state in which the airport is. It can therefore be seen that of the total production of 72000 MT of cut flowers and 212,000 MT of loose flowers, Karnataka exports only 4600 MT. The scope for growth is high but challenging due to the highly perishable nature and exacting standards of the international market.

Step 3 – Assuming a positive scenario for the purpose of infrastructure planning – Since past export based forecast is negative and the scope for volume growth is huge, an annual growth rate 1% has been assumed in consultation with industry experts and various stakeholders. On this assumption the exportable quantity of flowers for Karnataka would be 4900 MT up from current 4600 MT.

The major production regions for cut flowers would be Bangalore, Kolar and the surrounding areas where as for loose flowers the region would be along the coast from Kadagu to Shimoga and the facilities to be added would be discussed later.

Figure 24: Floriculture Export and growth rate



Source: UN Comtrade, PwC Analysis

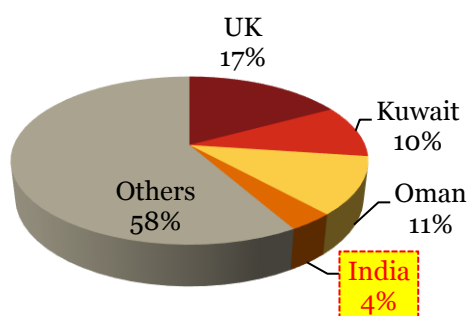
3.2.9. Mango Pulp

As a major producer of mango both mango and mango pulp are potential products of Karnataka. Currently Karnataka exports both. However, during the field visits during consultation with exporters, APEDA officials as well as state government the opinion that came through was that while fresh mangos were exported from the state, the real strength of the state was in mango pulp as two of its primary mango varieties name Bangalora (Totapuri) and Banganapalli (Baneshan, Safeda) are quite popular with the processors.

3.2.9.1. Projection of Exports

Step – 1 – Global Position of India - Major importers from India are UAE (24%), Nepal (23%), Saudi Arabia (17%) , UK (16%), Bangladesh (10%)) accounting for almost 80% of India’s mango exports. Within these markets, India ranks 4th with 4% market share by volume. US & Europe being the major importers of mangoes, India’s share of exports to these countries has been miniscule. Position of Indian Exports in terms of value is even lower as price realized per unit of produce exported is lower, Exports from India show a steep decline in 2013-14 due to quality issues; quality constraints in terms of compliance to Phyto-sanitary norms and violation of pesticide residual limits are the major impediments.

Figure 25: Major Competitors for India in Key Export Markets for Fresh Mangoes (by Volume)



Source: UN Comtrade, PwC Analysis

India faces competition from various other tropical countries which take advantage of the fact that they are located closer to the market. This is a significant advantage for a fruit like mango which has low shelf life. These countries with their established position in the fresh fruit market are then able to compete in the pulp market as well. These countries also have the advantage of having low local consumption. In India the exporters are competing with the local market traders as well.

Table 8: Exporters for Mango in the World

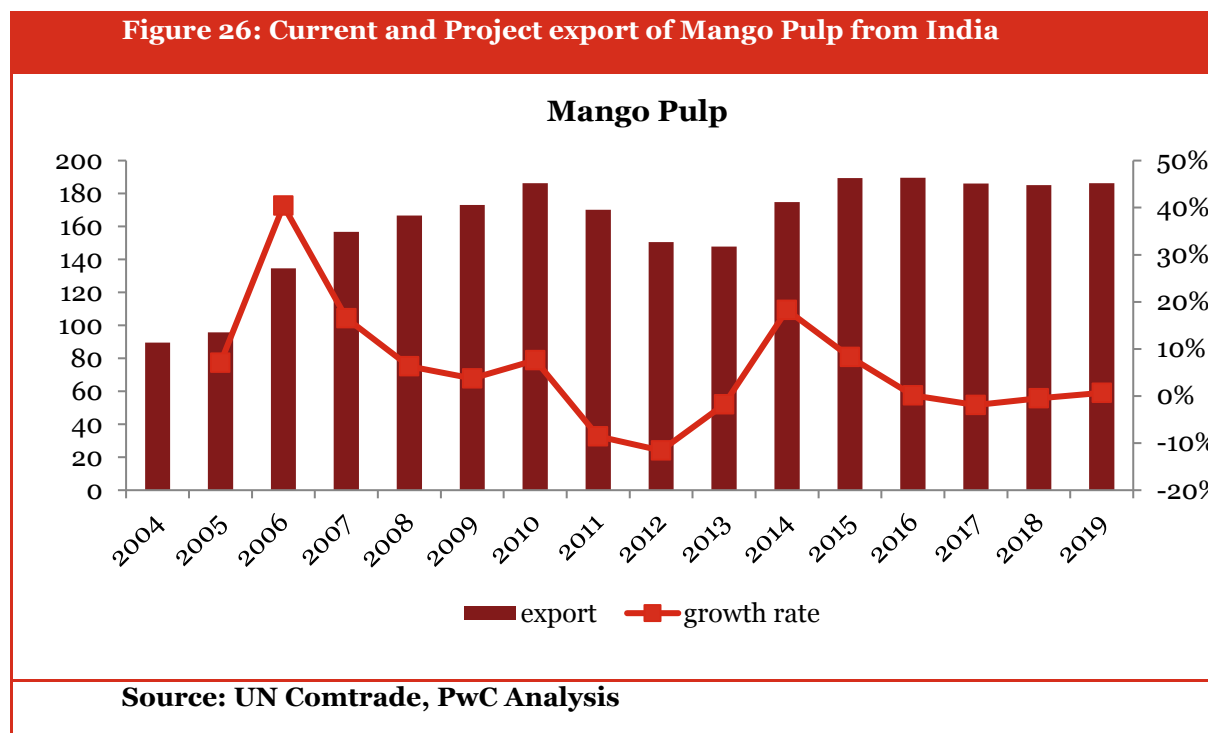
Rank	Area	Quantity (MMT)	Value USD)	(Mn Global Share (%)
1	Thailand	0.33	299	11.4
2	Mexico	0.26	203	8.9
3	Brazil	0.25	180	8.6
4	Peru	0.12	133	4.3

Source: UNComtrade

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The second issue with the comparing international trade is classification of the trade data. While India is not performing very well in the export scenario, the international trade data is even worse as it includes other crops like mangosteen in the classifications.

Step 2 - Projecting the export potential - There is no trade data available for international trade of Mango Pulp. So we need to project the trade data from India's past 10 years' performance of mango pulp trade.



Based on the past 10 years' export trend it is estimated that total pulp export from India will be about 186,000 tons in 5 years. It is also fair to estimate that the top 7 mango producing states (constituting 80% of the production) will be best placed to capture this export market as most investors are likely to set up facilities in high productivity areas. The top 7 mango producers are Uttar Pradesh, Andhra Pradesh, Karnataka, Telangana, Bihar, Maharashtra and Gujarat. The potential for pulp export can be taken in proportion of their production largely because it is not known how much each state it is producing at present.

Based on this assessment, Karnataka should be exporting 23000 tons of mango pulp i.e. if India is exporting 186,000 tons of pulp; Karnataka should be at least exporting 12.35% of it.

Mango processing unit has been proposed for basic level plant under PPP arrangement. This can be a demonstration facility for attracting more private investors. The number of operational plants in the region is not known. So if significant processing activity already exists, then this project need not be taken up.

3.2.10. Other Processing Opportunity

There are two other crops that can be used for developing processing infrastructure first is pulping of Sapota and the second is starch manufacturing from maize.

3.2.10.1. Sapota

Pulping of Sapota has not been considered highly feasible because the cluster in which it Sapota is concentrated does not have the opportunity for round the year processing. The crop is concentrated in northern Karnataka and most other crops suitable for pulping have similar harvest season as Sapota and the complementarity does not exist. However, while this recommendation is based on the production data, there can be individual pulping units which may have operations in perineal crops like tomato and may find Sapota viable. So even though a unit under PPP is not recommended, there is definite potential in development of Sapota pulping.

3.2.10.2. Maize Based Starch Unit

Maize is a highly volatile commodity where exported quantity as well as price realization per unit varies significantly as is highlighted by the below mentioned table –

Table 9: Export and Price of maize based starch

Export in 000 tons		Price US\$/Ton			
2003	207		\$	143	
2004	1,299	528%	\$	146	2%
2005	433	-67%	\$	170	17%
2006	634	46%	\$	165	-3%
2007	1,495	136%	\$	210	27%
2008	4,197	181%	\$	220	5%
2009	2,695	-36%	\$	198	-10%
2010	1,841	-32%	\$	290	47%
2011	3,952	115%	\$	274	-5%
2012	4,272	8%	\$	265	-3%
2013	4,750	11%	\$	265	0%
Source: UN Comtrade					

It is therefore recommended that 300 MT / Day processing capacity starch manufacturing facility in western Karnataka. This plant would consume 90,000 tons of maize and the state has a production of over 3 million tons of maize.

This project can set up PPP basis. India has growing maize starch export trade, the plant will further augment the same.

Table 10: India's Maize Starch trade

Year	Export in 000 tons
2003	8
2004	23
2005	13
2006	13
2007	20
2008	37
2009	28
2010	36
2011	81
2012	140
2013	184
CAGR	37%
Source: UN Comtrade	

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3.2.11. Summary of Infrastructure required in Karnataka

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 Karnataka, the commodities with significant potential for export are grapes, pomegranates, pineapples, papaya, mango pulp, sapota, tomato, gherkins, assorted vegetables (like drumstick, lady finger (okra), various gourds, beans etc.), floriculture and maize. Although these commodities are already being exported from the state but due to lack of infrastructure their actual potential has yet to be achieved. The infrastructure gaps are present in the form of non-availability of pack houses / non-availability of refer 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.

3.2.11.1. Exit Points for Karnataka

The exit options for export products from Karnataka are Mumbai – Sea and Air port, Cochin Sea Port and Bangalore Airport. Mangalore Sea Port is also an exit option used by exporters.

It needs to be noted that the preferred usage of a sea or airport is not driven by infrastructure around the port. It is driven by –

1. Destination port – all ports cater to a limited number of destination ports
2. Client’s preferred port – In case of FOB shipment clients simply provide the port in India where they want the goods delivered
3. Most exporters have long term tie- ups with shipping lines which in turn have their fixed
4. Shipping / Airlines service frequency offered at the port
5. The Shipping / Airlines service frequency is dependent on the volume of produce shipped.

The following calculation shows that in Karnataka, except for Bangalore cluster no other cluster is generating sufficient volume to justify even dedicated Cargo Freight Stations (CFS) to be created. A CFS needs at least 1000 per annum for TEUs for viability.

Sr. No	Cluster	Commodity Identified	Potential Exportable quantity (in 000 MT)	No of TEUs (@20 tons/TEU)
KARNATAKA				
1	Bangalore	Grape	10,000	3450 TEUs
		Papaya	5000	
		Tomato	54000	
2	Bijapur	Pomegranate	5000	750 TEUs
		Grapes	10,000	
3	Mangalore	Pineapples	13,500	675 TEUs

So for the period ending 2019, the cluster Bijapur will depend on conventional connectivity with Mumbai Sea and Air ports and Mangalore cluster will depend on Mangalore and Cochin Sea port. Additional infrastructure will not lead to an increase in sea and air freight service frequency (as volume

of agri produce is very low) and neither is it possible to change the flow of good from any existing busy port to some newly developed port.

Bangalore has sufficient volume increase, however the district already has two ICDs and exporters are not facing any congestion there, so the rationale for new export infrastructure does not exist. Bangalore Airport however needs a CPC (Center for Perishable Cargo) and therefore the same has been recommended.

3.2.11.2. Existing Infrastructure

3.2.11.2.1. Pack Houses

Karnataka has only 4 pack houses that are APEDA recognized guest houses and while the utilisation of the pack houses are not tracked even by the owners (because capacity varies with crop), yet the stakeholders interviewed were of the view that utilisation will not be less than 70-80% as the pack house are used for various crops round the year. Even by comparison to Maharashtra, which has over 50 pack houses, the infrastructure gap is significant. There are pack houses funded by National Horticulture Board and the state government but these are very small and basic and are not of significant use to exporters. These pack houses cater more to the domestic market. Exporters interviewed were of the view that pack houses are needed at the start of the value chain closer to the production center so that the goods are handled professionally (and enter cold chain if needed) at the earliest so that there is minimum value loss of produce. At the exit points need for pack houses was not felt.

3.2.11.2.2. Cold Stores

All stake holders were of the view that stand alone cold stores were neither needed nor viable unless the owner of the cold store himself is the primary user. There are 82 cold stores in Karnataka. Out of these 3 are known to be completely non-functional. These completely non-functional cold stores are located in Kolar, Hassan and Chikkaballapur and as such can be considered for conversion to pack houses. However the feasibility such conversion will have to be individually evaluated. So no cold stores are recommended and of the existing 3 can be considered for alternative development.

3.2.11.2.3. Food parks in Karnataka

There is only 1 Food Park in Karnataka, based in Tumkur and geared toward catering to the domestic market. The promoter Future Group (Big Bazaar) is also one of the primary buyers of the produce from this park.

3.2.11.2.4. 3rd Party Logistics

In India, there are a lot of third party logistics providers. 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 India. In addition to these, Shipping Corporation of India and Container Corporation of India are the two prominent public sector shipping and logistics players.

Based on exportable surplus estimated in the crop specific sections, the details of the proposed infrastructure along with the proposed capacities and estimated investment in the identified districts are provided below:

Sr. No	Cluster	Districts covered	Commodity Identified	Seasonality	Potential quantity that can be exported(in 000 MT)	Per day Capacity of the infrastructure required	Infrastructure required**	Capacity of each unit	Units required based on projected exports
1	Bangalore	Bangalore, Tumkur, Kolar, Ramnagara, Mandya, Mysore, Chamrajapur, Chikkaballapur	Grape	Feb-April	10,000	110 MT	Pack House	60 MT	2
			Mango			25 MT	Pulping	25 MT/Day	1
			Papaya	All Year	5000	20 MT (250 days year)	Pack House	60 MT	1
			Assorted Vegetables	All year	7000	28 MT (250 days year)	Pack House	60 MT	1
			Tomato	All year	54000	200 MT	Pack House	60 MT	3
			Floriculture (exotic)	November-February	2450		Center for Perishable Cargo at Bangalore	6000 MT/Annum	1
			Floriculture (processing)				Grading, Sorting and Packing line	9000 stems /Hour	1
2	Bijapur	Bijapur, Koppal, Bagalkote, Dharwad, Belgaum, Gadgad, Yadgir, Gulbarga	Pomegranate	Jan-April	5000	42 MT	Pack House	60 MT	1
			Grapes	Feb-April	10,000	110 MT	Pack House	60 MT	2
			Maize	Kharif	90,000		Starch Unit	300 MT/Day	1
3	Mangalore	Udupi, Dakshin Kannada, Uttara Kannada, Kodagu, Shimoga, Haveri	Pineapples	August - December	13,500	90 MT	Pack House	60 MT	2
			Floriculture (traditional)	All year	2450		Center for Perishable Cargo at Bangalore	6000 MT/Annum	-

** Standard capacity of a packhouse – Unit: Installed capacity/day

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Cost of the facilities

Sr. No	Location	Proposed Infrastructure	Capacity of the proposed infrastructure**	Estimated cost (in lakh)	Number of Units	Total cost in Lakh Rs
1	Bangalore	Pack House	60 MT	700	7	4900
		Perishable cargo Center	6000 MT/Annum	710	1	710
		Multi Juice and Pulp Unit*	25 MT/day	100	1	100
		Flower Grading sorting packing line	9000 stems /Hour	210	1	210
2	Bijapur	Pack House	60 MT	700	3	2100
		Starch Unit	300 MT/Day	9000	1	9000
3	Mangalore	Pack House	60 MT	700	2	1400
Total					16	18,420

** Capacity of a packhouse – Unit: Installed capacity/day

*Upgradation of existing unit for export purpose

Pack House

Consists of –

1. Grading sorting facility – 60 MT / Day
2. Ripening Facility – 150 MT
3. 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-I	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

3.2.12. Initial Basic Feasibility of the Infrastructure proposed

The focus of the study was identifying the infrastructure requirements across the 2 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 cluster by cluster.

3.2.12.1. Bangalore Cluster

At the Bangalore Cluster seven pack houses, one pulping unit, one automated flower processing unit (grading, sorting and packing line) have been proposed. In addition, a Centre for Perishable Cargo (CPC) facility has also been proposed.

3.2.12.1.1. Assessment of the Pack Houses proposed

A total of seven pack houses have been proposed for four crops, Grapes, Papaya, Assorted vegetables and Tomato where each pack house is required to be multi commodity pack house with an average daily through put of 60 tons of produce. While it is understandable that there would be capacity variance however, an average through put has been estimated for assessing the volume based viability.

So it is estimated that only the additional volume on account of additional export has been considered in keeping with the accounting principle of conservatism. The following table depicts the distribution of addition produce flow in a season wise distribution.

Table 11 Distribution of exportable surplus depending on seasonality

	Exportable surplus (in MT)	Seasonality	January – March	April - June	July - September	October - December
Crop						
Grapes	10,000	February – April	6666	3333		
Papaya	5,000	All year	1250	1250	1250	1250
Assorted Vegetables	7,000	All year	1750	1750	1750	1750
Tomato	54,000	All year	13500	13500	13500	13500
Total			23166	19833	16500	16500

The exportable surplus available with each crop is distributed proportionally according to its seasonality. This distribution helps in identifying the peak season when the pack house facilities will be used at its maximum. It is observed that the peak season is January – March, where the pack houses will be handling 23,166 MT of exportable surplus.

Capacity utilization and competition

The throughput for the January – March season will be 257 MT/day, as the exportable surplus is 23,166 MT and the seasonality is 90 days. The total capacity per day of all the pack houses is 420 MT (installed capacity of one pack house/day: 60MT and total pack houses proposed are 7). Therefore the capacity utilization in the peak season is calculated to be 61%, which suggests that it would be viable to operate the pack houses.

However, two new pack houses are coming up in this cluster in Kolar and Mysore. Therefore, we are required to reduce the number of pack houses being proposed to 5 pack houses instead of 7 pack houses. The existing pack houses in this cluster are being utilized to the level 70% as per the field level feedback however this is only an estimate as the utilisation is not tracked on continuous basis.

Hence the recommended number of pack houses is 5 for this cluster.

3.2.12.1.2. Assessment of Pulping Unit

One pulping unit has been proposed for Mango, with a per day capacity for processing 25 MT/day of surplus Mango pulp.

Capacity utilization and competition

Surplus quantity for pulping is 25 MT/day, and the capacity of one pulping unit is 25 MT/day, therefore the capacity utilization will be 100%, if it is assumed that it will be fully utilized to its capacity. Currently there are a large number of pulping units in the region bordering Karnataka, Tamil Nadu and erstwhile Andhra Pradesh. Yet it has recommended due to demand for the field level stakeholders, so only capacity enhancement of 25 MT/day is recommended and the feasibility of the same needs to be carried out with local availability of raw material.

3.2.12.1.3. Assessment of Centre for Perishable Cargo (CPC)

A CPC unit has been proposed at Bangalore which will cater to 2450 MT of exotic floriculture produce, with a seasonality of 120 days besides handling assorted fruits and vegetables being air shipped on a day to day basis.

Capacity utilization and competition

There exists a facility for processing of perishable cargo in Bangalore, however this facility is located in the old Bangalore airport and the exports happen from the new Bangalore airport. The distance between the CPC and the airport is about 40 kilometers and passes through the city. This requires the produce to first enter the city and leave for the airport which leads to delays on transit due to traffic on two legs of the journey. Therefore while a CPC facility is needed near the new Airport, the CPC in old airport needs to be discontinued.

3.2.12.1.4. Assessment of flower grading sorting line

One Grading, Sorting and Packing Line has been proposed at Bangalore cluster with a capacity of processing 9000 stems/hour for floriculture. The Grading line has a capacity of 9000 stems/hour. There is currently no APEDA approved Flower grading, sorting and packing Line, therefore it will not have any competition.

Capacity utilization and competition

In order to maintain quality of flowers/floriculture products for export purposes, a new grading, sorting and packing line (GSP Line) has been proposed. The flowers are graded and sorted at the field location itself by the farming community, and are sent for export directly from there. The flowers which do not meet the requirements of export quality are generally sold in the domestic market. However, setting up facility closer to the supply centers may not be feasible as the farms are dispersed and the aggregation may not happen in an efficient manner.

3.2.12.1.5. Location

Location should consider factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on availability of land at a particular location.

Commodities for export from Bangalore can be transported through various ports (Sea and Air port) depending on the export location. Approximate distance of Bangalore from: Mangalore is 373 km, Kochi is 537 km away, Marmagao is 602 km and Bangalore Airport is 38 km.

Private units have not been taken into consideration as they are under individual owners' supervision and used according to need.

3.2.12.2. Bijapur Cluster

In the Bijapur Cluster, three pack houses and one starch unit are proposed.

3.2.12.2.1. Assessment of the Pack Houses proposed

Requirement of three pack houses have been identified for two crops, Pomegranate and Grapes, and following is the feasibility table for the proposed pack houses.

Table 12 Distribution of exportable surplus depending on seasonality

	Exportable surplus (in MT)	Seasonality	January - March	April - June
Crop				
Pomegranate	5,000	January – April	3,750	1,250
Grapes	10,000	February - April	6,666	3,333
Total			10,416	4,583

The exportable surplus available with each crop is distributed proportionally according to its seasonality. This distribution helps in identifying the peak season when the pack house facilities will be used at its maximum. It is observed that the peak season is January – March, where the pack houses will be handling 10,416 MT of exportable surplus.

Capacity utilization and competition

The throughput for the January – March season will be 115 MT/day, as the exportable surplus is 10,416 MT and the seasonality is 90 days. The total capacity per day of all the pack houses is 180 MT (installed capacity of one pack house per day: 60MT and total pack houses proposed are 3). Therefore the capacity utilization in the peak season is calculated to be 64%, which suggests that it would be viable to operate the pack houses.

However, two new pack houses are coming up in the Bijapur Cluster, one in Belgaum and one in Kudchi therefore only one new pack house is being proposed in the Bijapur Cluster.

3.2.12.2.2. Location

Location should consider factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on availability of land at a particular location.

Commodities for export from Bijapur can be transported through various ports (Sea and Air port) depending on the export location. Approximate distance of Bijapur from: Mangalore is 570 km, Marmagao is 348 km, JNPT/Nhava Sheva is 484 km and Bangalore Airport is 539 km.

Private units have not been taken into consideration as they are under individual owners' supervision and used according to need.

3.2.12.3. Mangalore Cluster

In Mangalore cluster, one new packhouse is proposed for Pineapples.

3.2.12.3.1. Assessment of the Pack Houses proposed

The exportable surplus quantity for Pineapple is calculated to be 90 MT/day. The potential quantity that can be exported is 13500 MT. The seasonality of the crop is 150 days, from August to December.

Capacity utilization and competition

The installed capacity of a pack house/day is 60 MT, therefore two pack houses will be required, and its capacity utilization comes out to be 75%, if it is assumed that it will be fully utilized to its capacity. However since the seasonality of the crop of only from August to December i.e. 150 days, two dedicated pack houses only for Pineapple do not seem feasible. As there is one pack house currently being constructed at Haveri, which lies in the Mangalore cluster, no new pack house is being proposed in Mangalore.

3.2.12.4. Starch Unit in Bijapur Cluster

A Starch Unit has been proposed in Bijapur Cluster, which will be sourced from Maize. The capacity of a starch unit is 300 MT/day. The potential quantity that can be exported is 90000 MT, with a seasonality of 180 days.

The demand for modified starch is expected to grow at 4.1% from 2013 to 2018.² The functions of starch in food, feed, and non-food industry includes flocculation, binding water, film-forming properties, adhesiveness, improvement of pH stability, acidic stability, thickening, increase of shear stability, process tolerance, and many more properties. These are the special characteristics of modified starch that makes it useful in various industries.

The potential quantity that can be exported is 90000 MT, with seasonality of 180 days (Kharif season: Mid-April to Mid-October). The capacity of a starch unit is 300 MT/day. Currently there are no APEDA approved starch units at Bangalore, Mangalore and Bijapur Cluster. Private units have not been taken into consideration as they are under individual owners' supervision and used according to need.

² <http://www.prnewswire.com/news-releases/modified-starch-market-by-raw-material-corn-tapioca-potato-wheat-and-others-by-application-food-feed-and-non-food---global-trends--forecasts-to-2018-257247381.html>

3.2.12.5. Revised Cost of the facilities

The study findings were further rationalised with inputs from stakeholders to propose the following revised list of proposed facilities with revised cost estimates.

Table 13: Revised list of proposed infrastructure with cost estimates

Sr. No	Location	Proposed Infrastructure	Capacity of the proposed infrastructure**	Estimated cost (in lakh)	Number of Units	Total cost in Lakh Rs
1	Bangalore	Pack House	60 MT	700	5	3500
		Perishable cargo Center	6000 MT/Annum	710	1	710
		Pulping Unit*	25 MT/day	100	1	100
2	Bijapur	Pack House	60 MT	700	1	700
		Starch Unit	300 MT/Day	9000	1	9000
Total					9	14,010

** Capacity of a pack house – Unit: Installed capacity/day

*Upgradation of existing unit for export purpose

4. Identification of crop clusters and surplus availability for exports from Tamil Nadu

4.1. Methodology adopted for crop identification

There are varied type of fruits and vegetables produced in Tamil Nadu. Therefore we need to identify focus crops which have potential for export. In the same regards, focus crops in Tamil Nadu are identified on criteria's like their contribution to the countries overall production, their current level of exports from India, the estimated contribution of the state in the overall production and exports from India, existing and potential market linkage of the crop and export potential of the crop from the state.

In Tamil Nadu the major crops produced are banana, sapota, gooseberry, pear, carrots, tapioca, sorghum, ragi, maize, groundnut, other tropical vegetables like drumstick, okara, bottle gourd, snake gourd, chilies, capsicum etc. The crops which have international market for export and are exported from India are banana, , tapioca, maize and tropical vegetables. These crops also have strong market linkages and high potential for export. Apart from these crops, livestock products like eggs and chicken meat also has the potential to be exported from the state.

4.2. Methodology adopted to calculate surplus available for export

The calculation of the surplus present in the state that can be exported is based on the total production of the commodity in the state, wastage and domestic consumption. After deducting domestic consumption and wastage from the total production we realize the total surplus available with the state that can either be exported or can be domestically consumed in other states of the country. After this we apply Pareto principle for calculating the overall exportable potential from the state. Out of the total production of the commodity only 20 percent of the produce is suitable for export in the international market. Out of this suitable exportable produce, again 80 percent of the quantity will be directed into the domestic market and thus only 20 percent of the exportable produce is actually the potential exportable surplus. This way with the application of Pareto Principle we calculated the total surplus available for exports. We also applied discounting factor for several crops in consultation with the exporters.

The projection of the future potential quantity available for export, we forecasted the future potential export quantity based on the trends of the last 10 years exports and projected them for further coming years. Based on the current capacity and the future capacity required we identified the capacity of the proposed infrastructure.

APEDA has already identified Tuticorin as cluster for dry flowers, Theni / Thrichy for Bananas and Namakkal / Udumalpet for Poultry. While dry flowers are not perishable and the infrastructure required is not much, Banana and Poultry clusters have been dealt with in the subsequent section and suitable infrastructure recommended.

4.3. Crop wise identification of the cluster and surplus available in Tamil Nadu

4.3.1. Banana in Tamil Nadu

Banana is one of the most important fruit crop in India. Currently nearly in respect of area it ranks second and first in production only after mango in this country. India leads the world in banana production with an annual output of about 29.72 Million tonnes³. In India Tamil Nadu leads in total production with 5.65 Million tonnes⁴. The banana culture in India is as old as Indian civilization. It seems that it is one of the earliest fruit crops grown by mankind at the dawn of civilization.

Considering the nutritive value and fruit value of bananas, it is the most widely available fruit among all other fruits in the country. Considering the year round availability of fruits, unlike the seasonal availability of other tree fruits, it has become an inevitable necessity in any household in India, for all functions. The bananas were grown in Southern Asia even before the prehistoric periods and the world's largest diversity in banana population is found in this area. Hence, it is generally agreed that all the edible bananas and plantains are indigenous to the warm, moist regions of tropical Asia comprising the regions of India, Burma, Thailand and Indo China.

India's share in the global banana production stands at 26 percent⁵ followed by countries like China, Philippines, Ecuador, Brazil and Indonesia. In terms of exports, the top 4 exporters of banana are Ecuador, Philippines, Guatemala and Cost Rica. The overall global trade in banana is expected to be of the order of 9497 Million USD and **India's share in the total exports of bananas stand at 0.14% of the total quantity exported around the world⁶**. So it can be concluded that although India produces a major quantity of the global banana production, its export in the international market is very low. This can be attributed to high postharvest losses and high domestic consumption. India exports both Cavendish G9 and traditional varieties.

The major importing destinations from India are UAE, Nepal, Saudi Arabia, Oman and Kuwait. These destinations together constitute more than 80 percent of the total export from India. The distribution of exports of bananas from India is provided below:

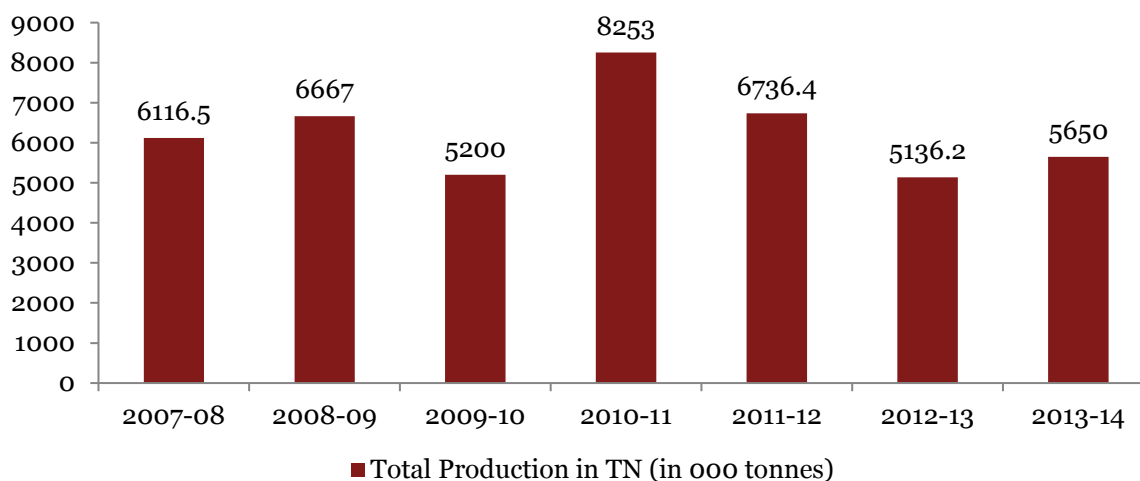
³ National Horticulture data base 2013.

⁴ National Horticulture database 2013.

⁵ FAOStat

⁶ UNComtrade

Figure 29: Total production of banana in Tamil Nadu (in 000 tonne)

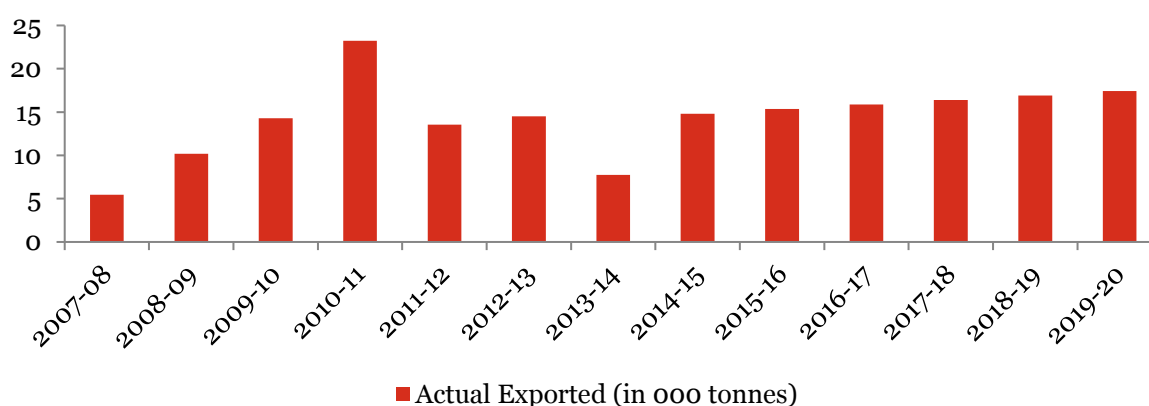


Source: PwC analysis, Indiatat, National Horticulture Database.

In terms of export, India is not exporting a major quantity to the international market. Only 0.2%⁸ of the total production of banana is export out of India in 2012-13. This shows a lot of potential for increasing the export of bananas from India. In order to enhance the overall export of bananas from India, major focus should be on increasing exports from Tamil Nadu as it is the leading producer of bananas in India.

It has been observed that although the Tamil Nadu is the largest producer of bananas in India, it is also the largest consumer of bananas. But still it has the potential to increase the overall export of banana from the country. The estimated current and potential export of bananas from Tamil Nadu (based on previous trends) is illustrated below:

Figure 30: Actual and Potential Export of banana from Tamil Nadu



Source: PwC analysis

⁸ UNcomtrade data

Based on the methodology discussed in section 4.2 we calculate the total potential for banana export in Tamil Nadu along with the proposed capacity of the identified infrastructure. The available surplus with Tamil Nadu for export is 22.6 thousand MT⁹. This clearly indicates that there is a huge gap between the actual and potential exports in terms of banana. The calculation for the surplus available in Tamil Nadu is illustrated below:

Table 14: Calculation of the surplus for banana and the capacity of the identified infrastructure

Statement	Value
Total Production of bananas in Tamil Nadu in 2013-14 (in 000 tonnes)	5650
Applying Pareto Principle we get total potential for exports (in 000 tonnes)	226
Total projected potential in 2019	250.76
Total current export from India (in 000 tonnes)	28.1
Total exports from Tamil Nadu (in 000 tonnes)	7.7
As the potential for export of export from Tamil Nadu is very high, in coming years we cannot achieve this figure practically. Therefore in consultation with the exporters we have discounted the potential availability, which comes out to be	25.08
The arrival of this crop in a year (in days)	300
Extra per day arrival (in tonnes)	58
Therefore the capacity of the proposed infrastructure should be minimum (in MT/day)	60

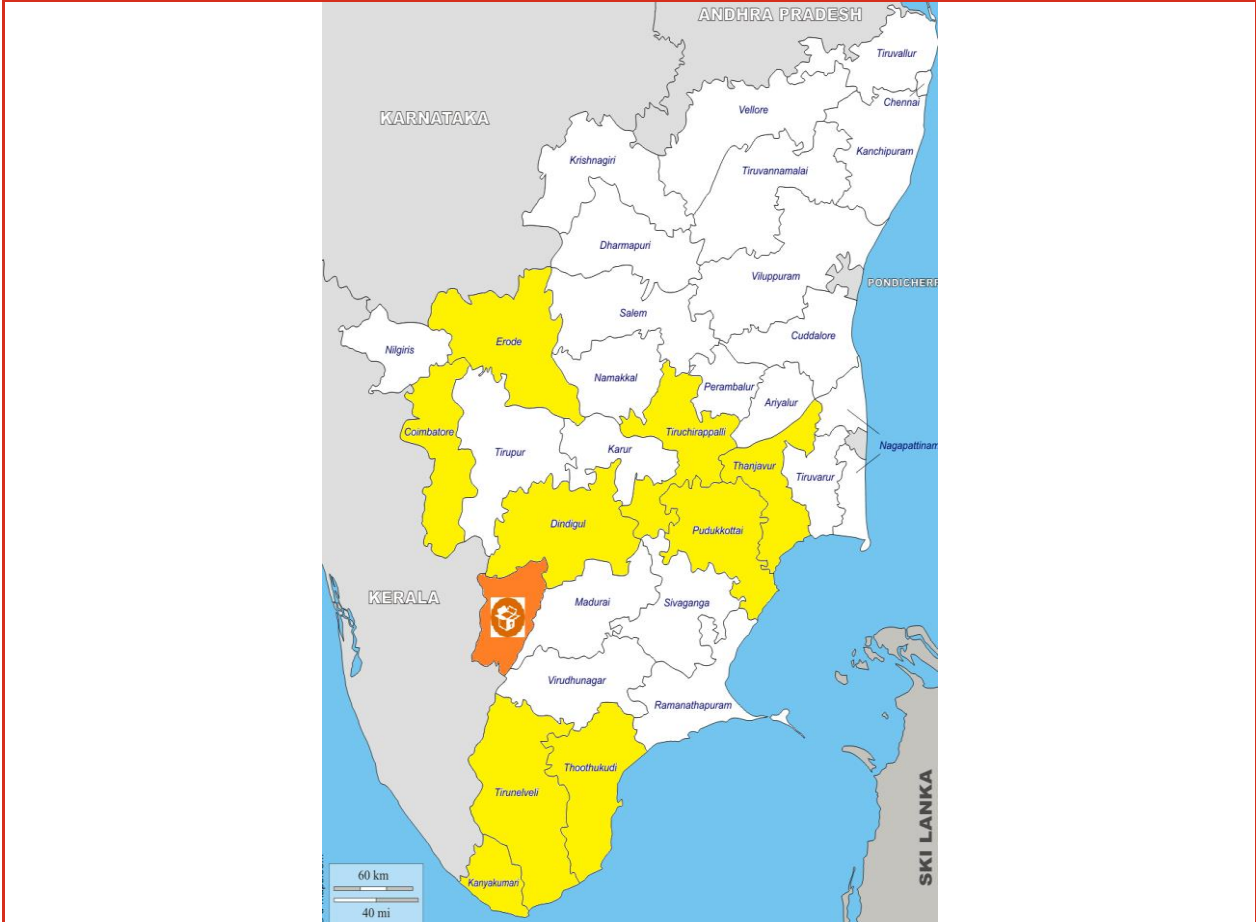
The gap identified in the above calculation needs to be filled by providing appropriate infrastructure to support the export operations. As per the locations shown in Figure 28 we have identified that the proposed infrastructure should be located in Theni as it is at the minimum distance from all the major banana producing districts.

It has been observed that the infrastructure requirement for the value added products of banana like banana chips; banana cookies, banana powder etc. are minimal as they have longer shelf life as compared to raw banana. Therefore we require export infrastructure for export of raw banana¹⁰. Therefore we propose a pack house facility integrated with ripening chamber for the export of bananas from Theni.

⁹ Calculation is shown in detail in **Annexure A.2**

¹⁰ Exporters Opinion

Figure 31: Actual and Potential Export of banana from Tamil Nadu



Source: PwC analysis, Indiatat

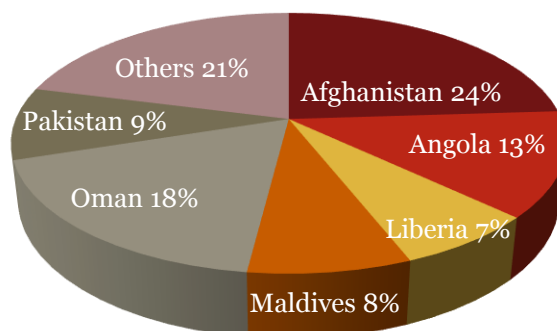
4.3.2. Eggs in Tamil Nadu

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 eggs¹¹.

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 USD¹² 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 produces 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.

The major importing destinations from India are Afghanistan, Angola, Pakistan, Oman, Liberia and Maldives. These destinations together constitute more than 80 percent of the total export from India¹³. The distribution of exports of bananas from India is provided below:

Figure 32: Major Egg importing nations from India.



Source: PwC analysis, UNCOMTRADE

¹¹ Basic Animal Husbandry Statistics 2013

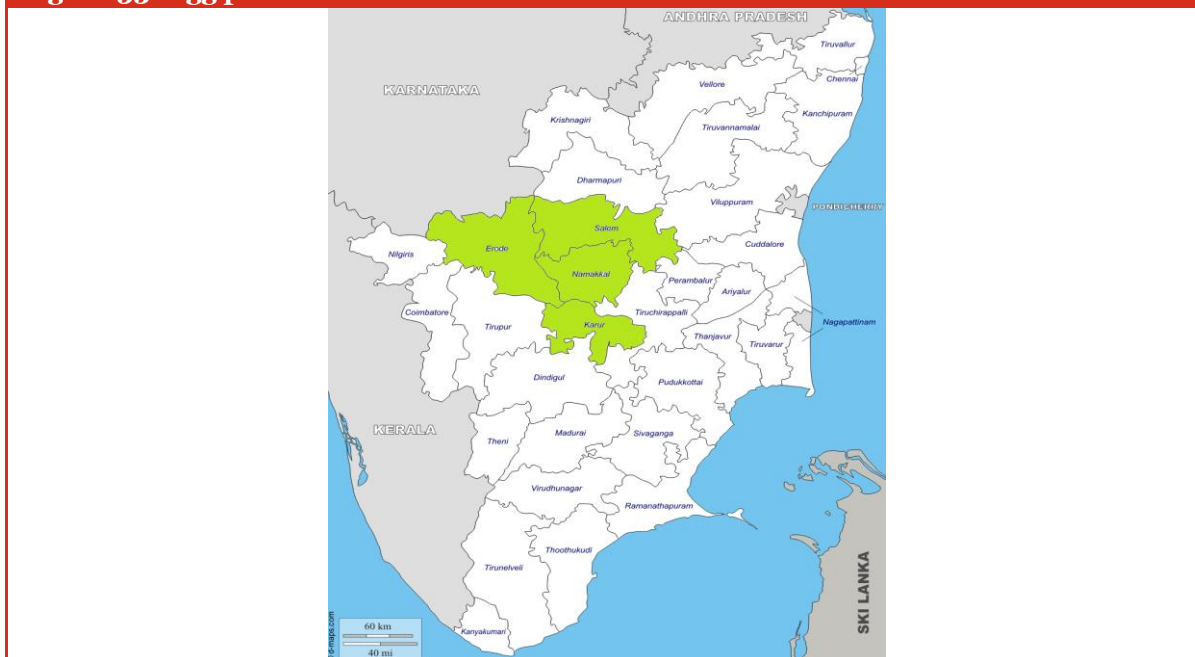
¹² UN Comtrade

¹³ UN Comtrade

Surplus available for export

In terms of production, the major egg producing states in India are Andhra Pradesh followed by Tamil Nadu, Maharashtra, West Bengal and Haryana. Tamil Nadu is the second largest egg producing state in the country with a total share of 18 percent of the total production in the country. The major egg producing districts in Tamil Nadu are illustrated below:

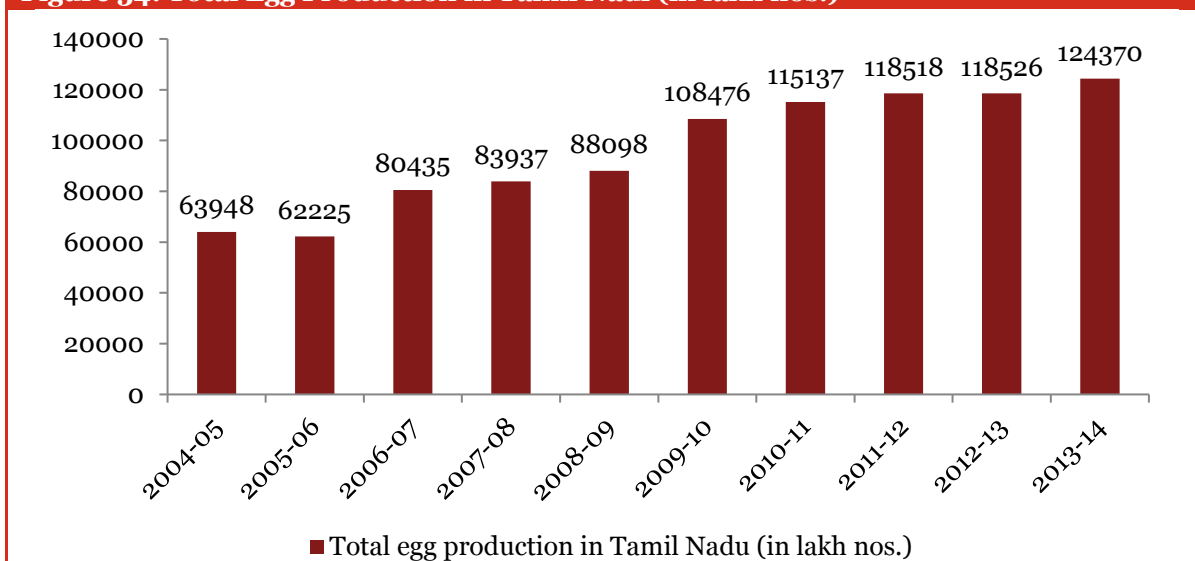
Figure 33: Egg production zones in Tamil Nadu



Source: PwC analysis, UNCOMTRADE

The general trend in the overall production of eggs in Tamil Nadu is shown below:

Figure 34: Total Egg Production in Tamil Nadi (in lakh nos.)

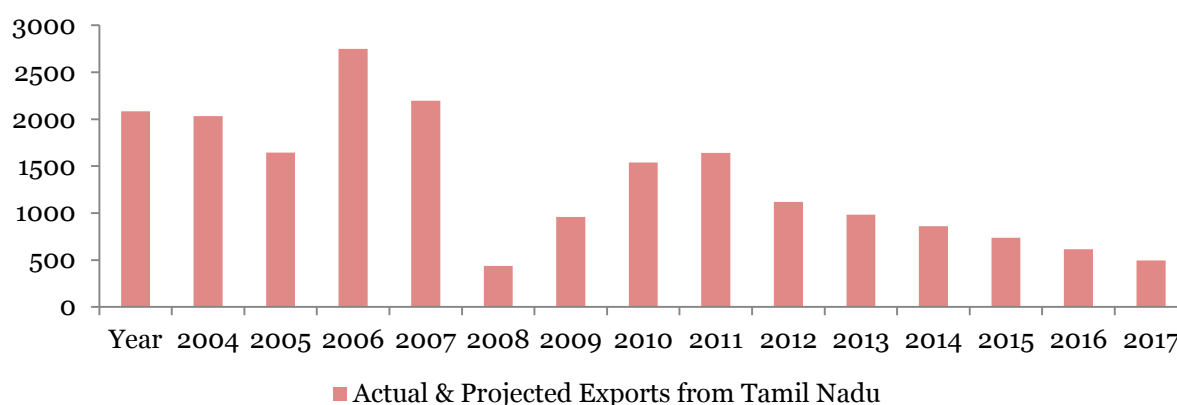


Source: PwC analysis, Indiatat, National Horticulture Database.

In terms of export, India is not exporting a major quantity of eggs to the international market. Only 1% of the total production of egg is export out of India in 2012-13¹⁴. This shows a lot of potential for increasing the export of eggs from India. In order to enhance the overall export of eggs from India, major focus should be on increasing exports from Tamil Nadu as it is a major producer of eggs in India.

It has been observed that although the Tamil Nadu is the second largest producer of eggs in India, it is also a major consumer of eggs. But still it has the potential to increase the overall export of eggs from the country. The actual exports of eggs from Tamil Nadu (based on previous trends) is calculated in **Annexure A.4** and illustrated below:

Figure 35: Actual and projected exports from Tamil Nadu



Source: PwC analysis

Based on the methodology discussed in section 4.2 we calculate the total potential for egg export in Tamil Nadu along with the proposed capacity of the identified infrastructure. The available surplus with Tamil Nadu for export is 3281 lakh eggs¹⁵. This clearly indicates that there is a huge gap between the actual and potential exports in terms of egg. The surplus eggs available in Tamil Nadu are provided below:

Table 15: Calculation of the surplus for egg and the capacity of the identified infrastructure

Statement	Value
Total Production of eggs in Tamil Nadu in 2012-13 (in lakh nos)	118526
Applying Pareto Principle we get total potential for exports (in lakh nos)	4298
Total production of egg project in 2019 (in lakh nos)	6354
Total current export from India (in lakh nos)	6356
Total exports from Tamil Nadu (in lakh nos)	1641
As the potential for export of export from Tamil Nadu is very high, in coming years we cannot achieve this figure practically. Therefore in consultation with the exporters we have discounted the potential availability, which comes out to be (in lakh nos)	3281
The arrival of this crop in a year (in days)	300
Hence per day extra arrival (in lakh nos)	5
Extra Per day arrival (in lakh nos)	5
Therefore the capacity of the proposed infrastructure should be minimum (in lakh/day)	5lakh eggs/day

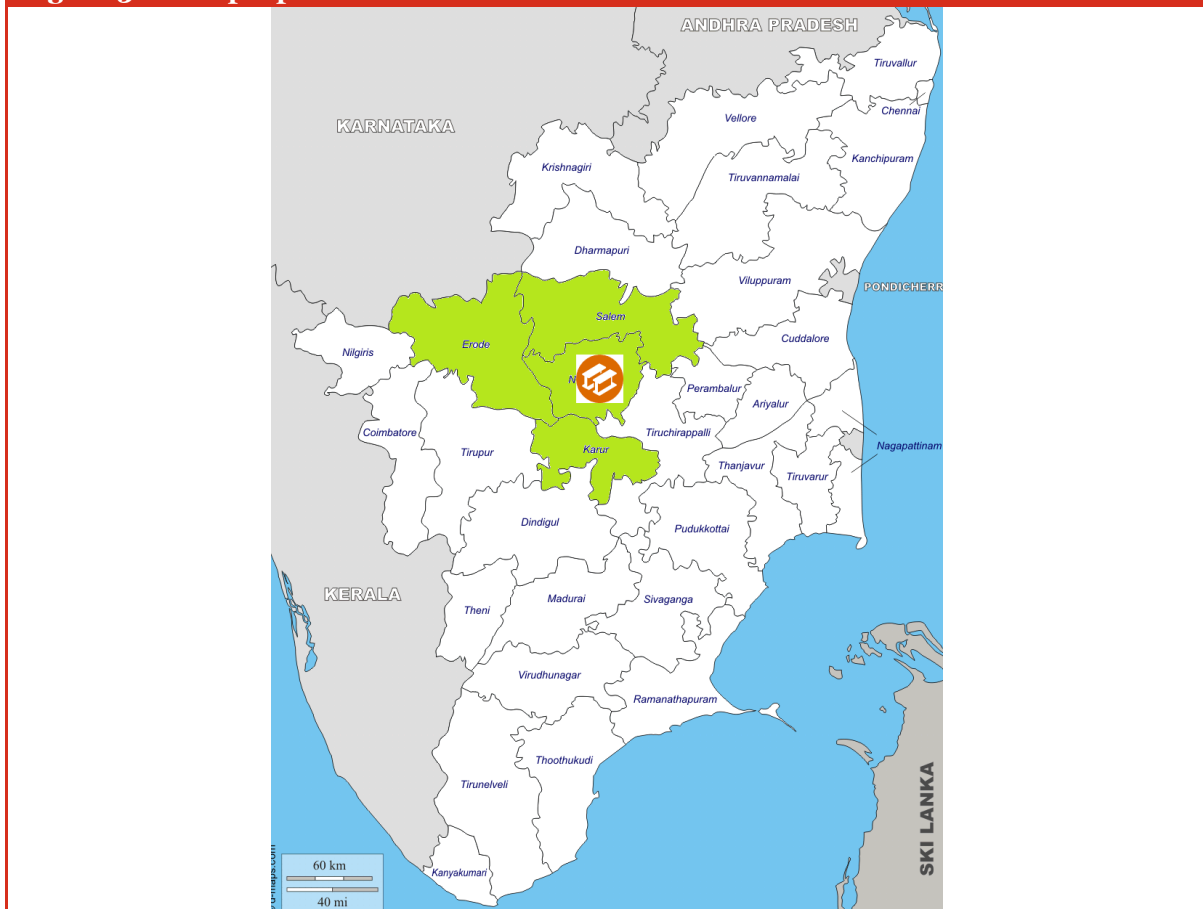
¹⁴ UN Comtrade

¹⁵ Calculation is shown in detail in **Appendix A.4**

The gap identified needs to be filled by providing appropriate infrastructure to support the export operations. As per the locations shown in Figure 33 we have identified that the proposed infrastructure should be located in Nammakkal as it is at the minimum distance from all the major egg producing districts.

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 in the raw perishable egg. Therefore we propose refer containers for exports of raw eggs.

Figure 36: Our proposed location for the identified infrastructure



Source: PwC analysis

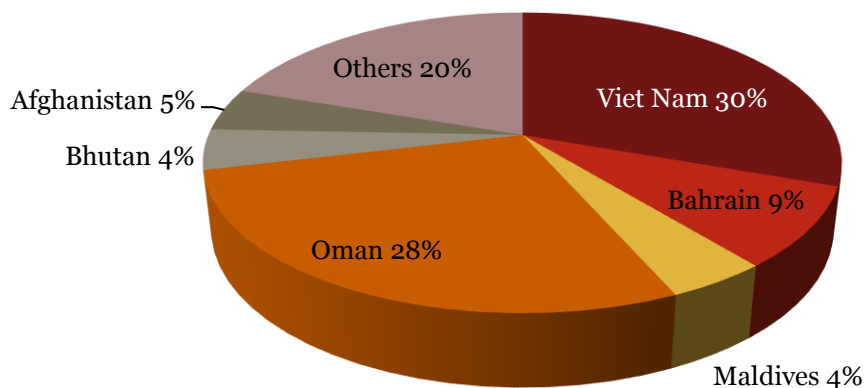
4.3.3. Chicken Meat in Tamil Nadu

India has is the world’s second largest emerging economy and with this it has a large and rapidly expanding poultry sector. Poultry in agriculture segment is one of the fastest growing sectors in India with an average growth rate of 6 percent in egg production and 12 percent for broiler production per annum. Among many key factors are responsible for driving the recent growth of the Indian poultry sector, First and foremost is the rise in consumer demand for poultry, which is driven by both income growth and changes in prices of poultry meat relative to other goods. Second, the structure of India’s poultry market is witnessing a sharp change. In particular, integration of poultry production in a vertical manner and appropriate marketing methodology has lowered costs of production, marketing margins, and consumer prices of poultry-meat.

India’s share in the global chicken meat production stands at 2 percent followed by countries like US, China, Brazil, Russia and Mexico¹⁶. In terms of exports, the top 4 exporters of chicken meat are US, Brazil, Netherland and Poland. The overall global trade in chicken meat is expected to be of the order of 27762 Million USD¹⁷ and India’s share in the total exports of chicken meat stand at 0.04% of the total quantity exported around the world. So it can be concluded that although India produces a significant quantity of the global chicken meat production, its export in the international market is very low. This can be attributed to high domestic consumption.

The major importing destinations from India are Viet Nam, Oman, Bahrain, Maldives, Bhutan and Afghanistan. These destinations together constitute more than 80 percent of the total export from India. The distribution of exports of bananas from India is provided below:

Figure 37: Major Chicken importing nations from India.



Source: PwC analysis, UNCOMTRADE

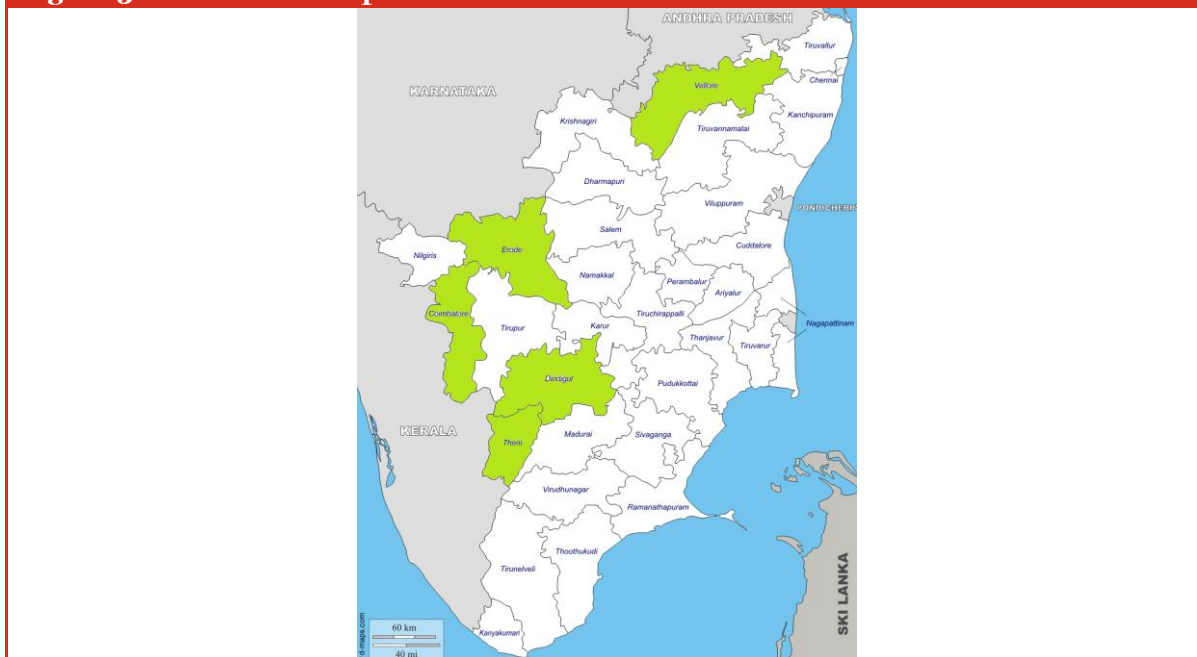
¹⁶ UN Comtrade

¹⁷ UN Comtrade

Surplus available for export

In terms of production in India, the major chicken producing states are Andhra Pradesh followed by Tamil Nadu, Maharashtra and West Bengal. Tamil Nadu is the second largest chicken meat producing state in the country with a total share of 14 percent of the total production in the country. The major chicken meat producing districts in Tamil Nadu are illustrated below:

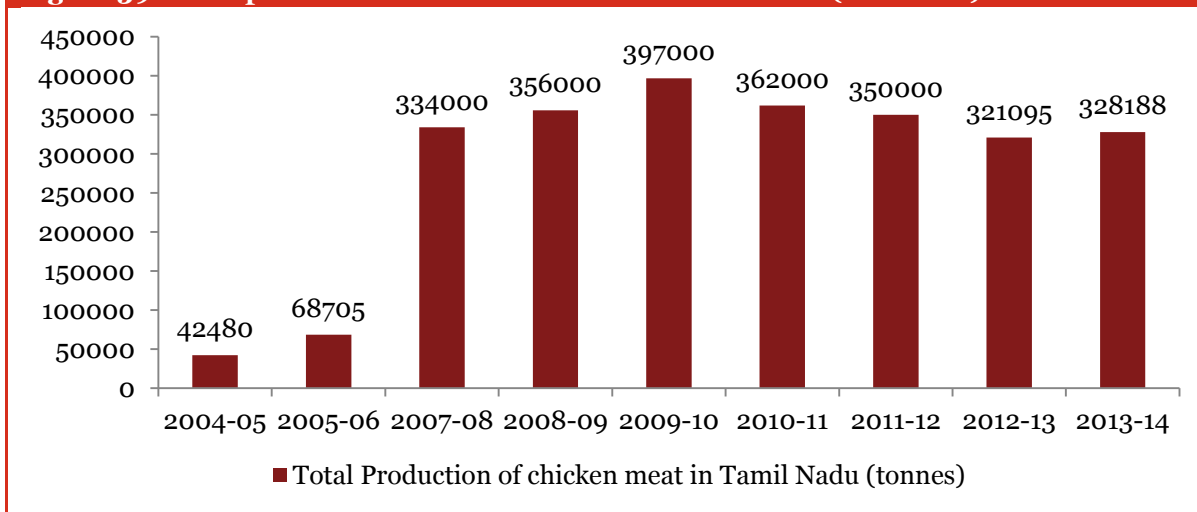
Figure 38: Chicken meat production zones in Tamil Nadu



Source: PwC analysis, UNCOMTRADE

The general trend in the overall production of chicken meat in Tamil Nadu is shown below:

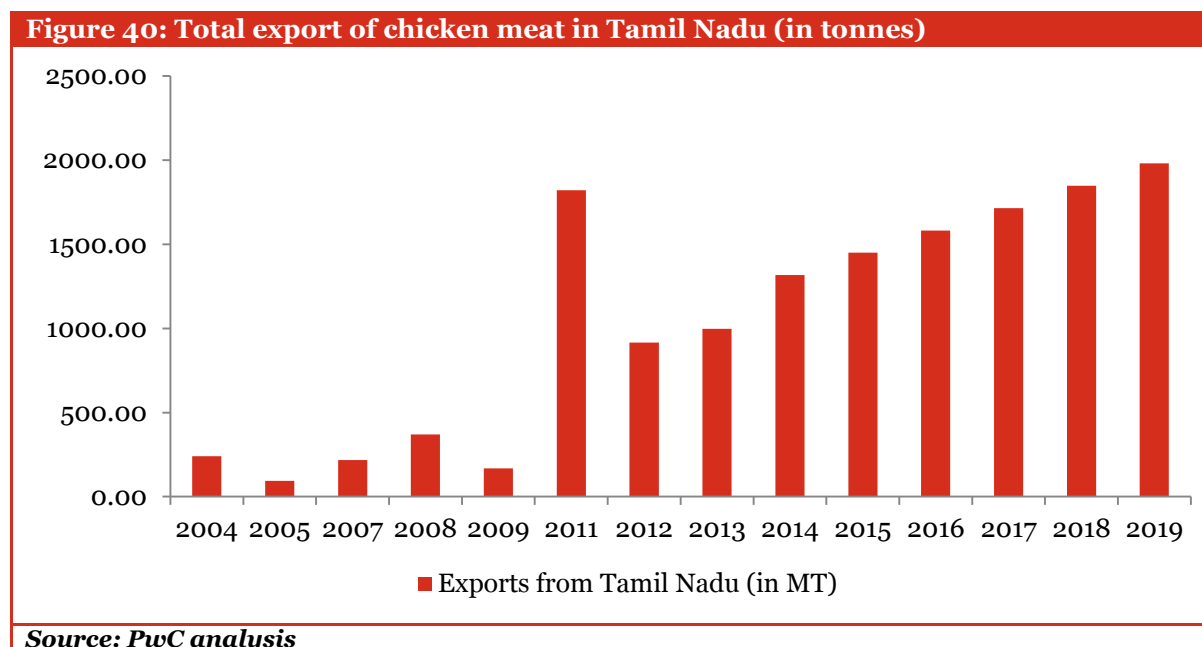
Figure 39: Total production of chicken meat in Tamil Nadu (in tonnes)



Source: PwC analysis, Indiatat, Basic Animal Husbandry Statistics

In terms of export, India is not exporting a major quantity of chicken meat to the international market. Only 0.4% of the total production of chicken meat is export out of India in 2012-13. This shows a lot of

potential for increasing the export of chicken meat from India. In order to enhance the overall export of chicken meat from India, major focus should be on increasing exports from Tamil Nadu as it is a major producer of chicken meat in India.



It has been observed that although the Tamil Nadu is the second largest producer of chicken meat in India, it is also a major consumer of chicken meat. But still it has the potential to increase the overall export of chicken meat from the country.

Based on the methodology discussed in section 4.2 we calculate the total potential for chicken meat export in Tamil Nadu along with the proposed capacity of the identified infrastructure. Although the chicken meat export is increasing we require quality standards in the overall exports of chicken meat. As per the exporters, infrastructure is required to enhance the quality and shelf life of the chicken meat. Therefore we propose a irradiation facility to enhance the export of chicken meat from Tamil Nadu.

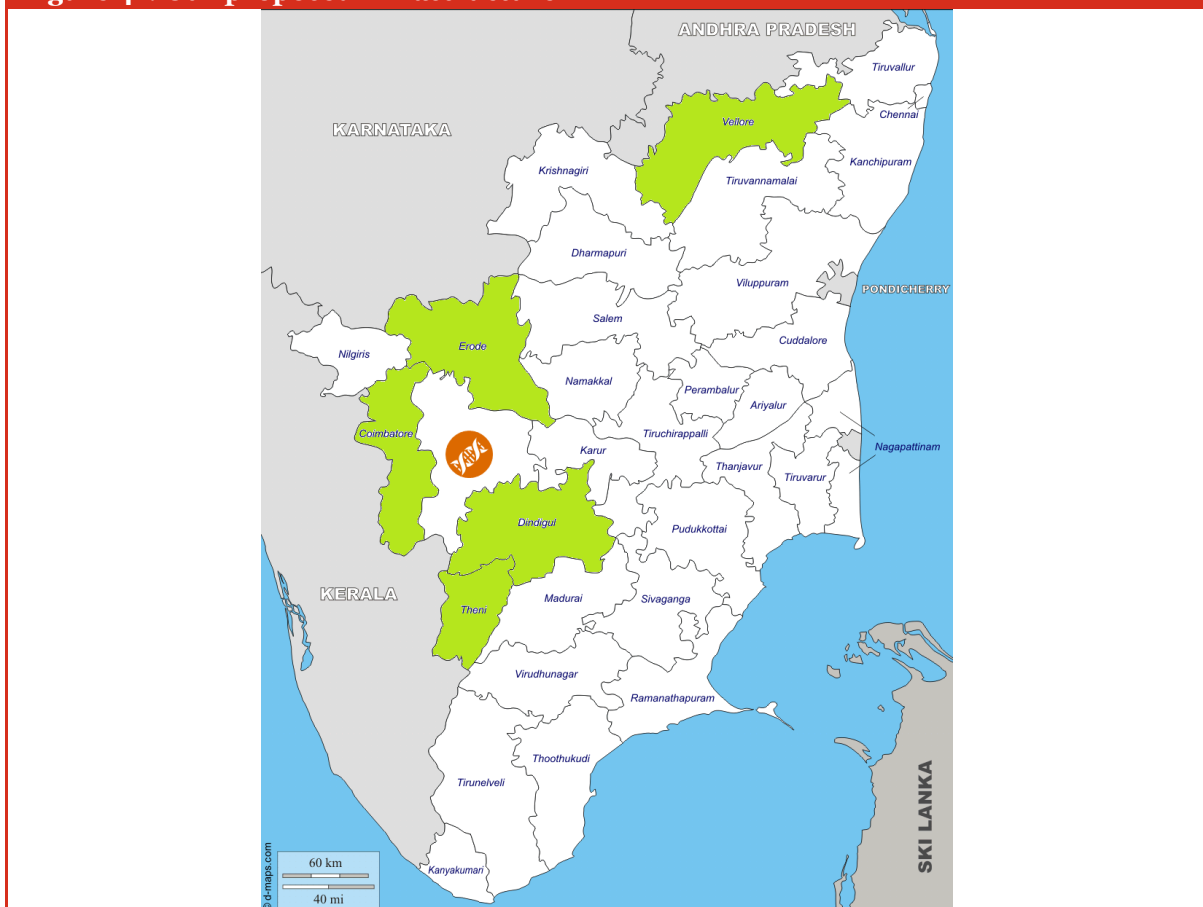
As per the locations shown in Figure 38 we have identified that the proposed infrastructure should be located in Tirupur as it is at the minimum distance from all the major chicken meat producing districts.

Therefore we propose Irradiation Facility for exports of chicken meat.

Acceptability of irradiation of food

Irradiation in food reduces the risk of food borne illness, prevent the spread of invasive pests, and delay or eliminate sprouting or ripening. Food irradiation is permitted by over 60 countries, with about 500,000 metric tons of foodstuffs annually processed worldwide. United States is the major consumer of irradiated food. The type of food irradiated includes fruits, vegetables and meat products. Apart from its own installed capacity of irradiated food, United States import irradiated food from Mexico, Thailand, Viet Nam and India. In European countries Belgium, Netherlands and France are the major suppliers of irradiated meat.

Figure 41: Our proposed infrastructure



Source: PwC analysis

4.3.4. Maize and Tapioca in Tamil Nadu

Maize is one of the most important cereal crops of the world and contributes to food security in most of the developing countries. In India, maize is emerging as third most important crop after rice and wheat. Its importance lies in the fact that it is not only used for human food and animal feed but at the same time it is also widely used for corn starch industry, corn oil production, baby corns etc.

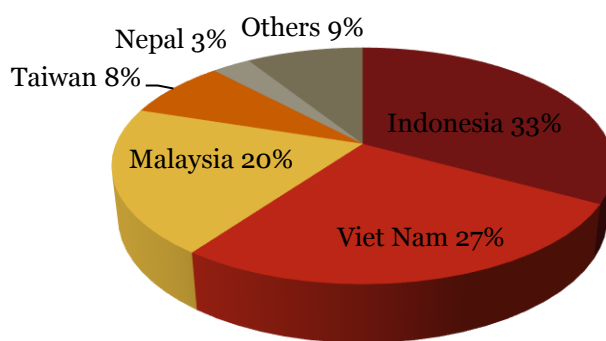
Corn production has nearly doubled from around 12.0 million tons in the early 2000s to around 22 million tons today. This remarkable production growth has been largely driven by adoption of single cross hybrids in the late 1980's and continuous demand in domestic and export market. The increasing use of maize as feed, increasing interest of the consumers in nutritionally enriched products and rising demand for maize seed are the core driving forces behind emerging importance of maize crop in India.

Maize production is dominated by Andhra Pradesh and Karnataka. Nine states viz. Karnataka, Andhra Pradesh, Tamil Nadu, Rajasthan, Maharashtra, Bihar, Uttar Pradesh, Madhya Pradesh and Gujarat account for 85 per cent of India's maize production and 80 per cent of area under cultivation.

India has witnessed a jump in maize exports from 2007-08. The increase in export volumes is a result of increased production, higher realization and demand for maize from international markets. Export volume declined during the period 2009-2011 due to drought conditions leading to low production. Increase local demand for maize from poultry and starch industries, within India, and application in diversified industries such as alcoholic beverages, bio-fuel, processed food, corn oil, etc., has kept maize prices relatively steady. Exports have declined in 2013-14 due to weak export demand which is due to relatively weak global prices on improved supplies from other competing locations.

The major importing destinations from India are Indonesia, Viet Nam, Malaysia, Taiwan and Nepal. These destinations together constitute more than 80 percent of the total export from India. The distribution of exports of maize from India is provided below:

Figure 42: Major Maize importing nations from India.



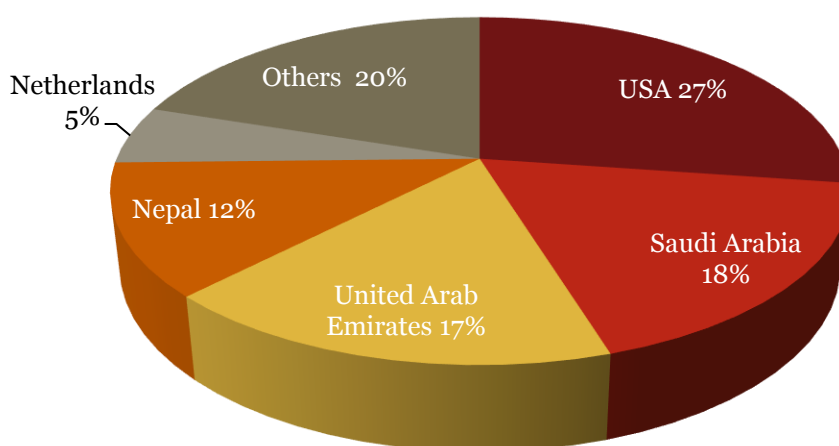
Source: PwC analysis, UNCOMTRADE

Tapioca is a starch that comes from the roots of a shrub-like plant called cassava. By itself, tapioca is nearly flavorless. It is most commonly used as a food thickener, and is perhaps best known as an ingredient in tapioca pudding. The demand for tapioca has emerged due to rising costs of maize have started using tapioca starch as an alternative to maize starch. India currently produces only 3 percent of the total world production of tapioca. Tamil Nadu is the largest producer of tapioca in the country and it also stands first into production of starch and tapioca pearls. Salem district of Tamil Nadu plays a major role in serving the domestic tapioca market.

Tamil Nadu alone accounts for more than 60 percent of the total production of tapioca in India. The remarkable increase in the production of tapioca in Tamil Nadu is due to high productivity of the crop in the state. The crop has become an important raw material for the starch and sago industry established in Salem and Dharampuri districts of Tamil Nadu. The use pattern in Tamil Nadu, particularly in the Salem district has been quite different. Here tapioca was used principally in the processing factories and the demand for direct consumption was negligible.

The export of tapioca is very minimal from India. The major tapioca importing countries from India are US, Saudi Arabia, UAE, Nepal and Netherlands. These countries constitute nearly 80 percent of the total export of tapioca from India. The distribution of exports of maize from India is provided below:

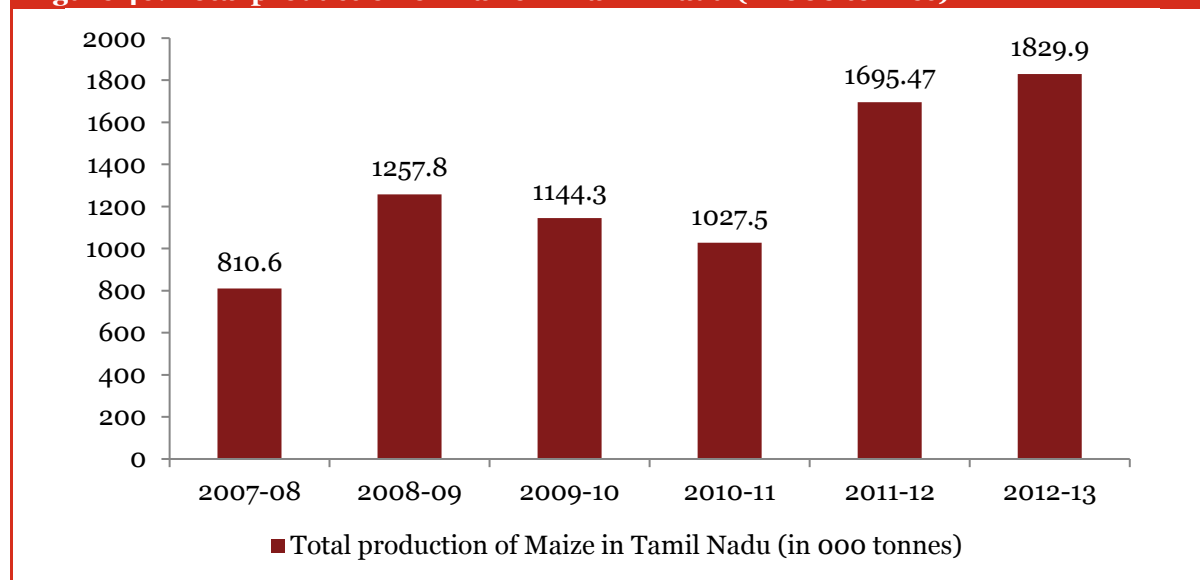
Figure 43: Major Tapioca importing nations from India.



Source: PwC analysis, UNCOMTRADE

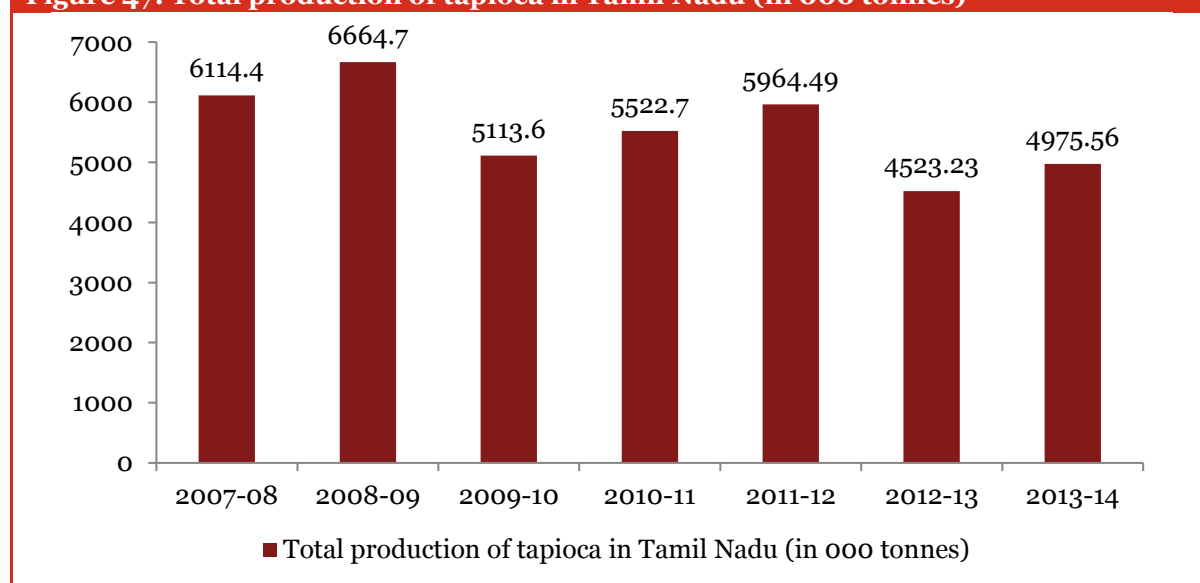
The general trend in the overall production of maize and tapioca in Tamil Nadu is shown below:

Figure 46: Total production of maize in Tamil Nadu (in 000 tonnes)



Source: PwC analysis, Indiastat, National Horticulture Database.

Figure 47: Total production of tapioca in Tamil Nadu (in 000 tonnes)



Source: PwC analysis, Indiastat, National Horticulture Database.

In terms of export, India is not exporting a major quantity of maize and tapioca to the international market. Only 0.03% of the total production of tapioca is export out of India in 2013-14. This shows a lot of potential for increasing the export of tapioca and tapioca based products from India. In order to enhance the overall export of tapioca and tapioca based products from India, major focus should be on increasing exports from Tamil Nadu as it is a major producer of tapioca in India.

Similarly in case of maize, India has witnessed a jump in maize exports from 2007-08. The increase in export volumes is a result of increased production, higher realization and demand for maize from international markets. Export volume declined during the period 2009-2011 due to drought conditions leading to low production. Increase local demand for maize from poultry and starch industries, within India, and application in diversified industries such as alcoholic beverages, bio-fuel, processed food, corn oil, etc., has kept maize prices relatively steady. Exports have declined in 2013-14 due to weak export demand which is due to relatively weak global prices on improved supplies from other competing locations. India has exported 13 percent of its total maize production in 2013-14.

The above argument clearly indicates that there is a huge gap between the actual and potential exports in terms of maize and tapioca. The gap needs to be filled by providing appropriate infrastructure to support the export operations. Therefore apart from exporting maize in raw form, we can convert the raw maize into value added product like starch which has high global demand and better price than raw material in international market. In the same regards we propose to set up a starch unit at Erode for the processing of tapioca and maize.

The total amount of maize and tapioca available for processing is calculated below:

Table 16: Calculation of the surplus for maize & tapioca and the capacity of the identified infrastructure

Statement¹⁸	Value
Total surplus of Maize available in Tamil Nadu in 2019 (in 000 tonnes)	102.07
Total surplus of Tapioca available in Tamil Nadu in 2019 (in 000 tonnes)	117.37
Total surplus of maize that can be converted to starch	10%
Total surplus of tapioca that can be converted to starch	50%
Total maize available for starch production (in tonnes)	10207.4
Total tapioca available for starch production (in tonnes)	58685
Total number of working days	250
Total per day availability of maize	40.8
Total per day availability of tapioca	234.7
Total capacity of the plant per day	275.56

¹⁸ See all figure from **Appendix A**

4.3.5. Other Vegetables in Tamil Nadu

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 crops. 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.

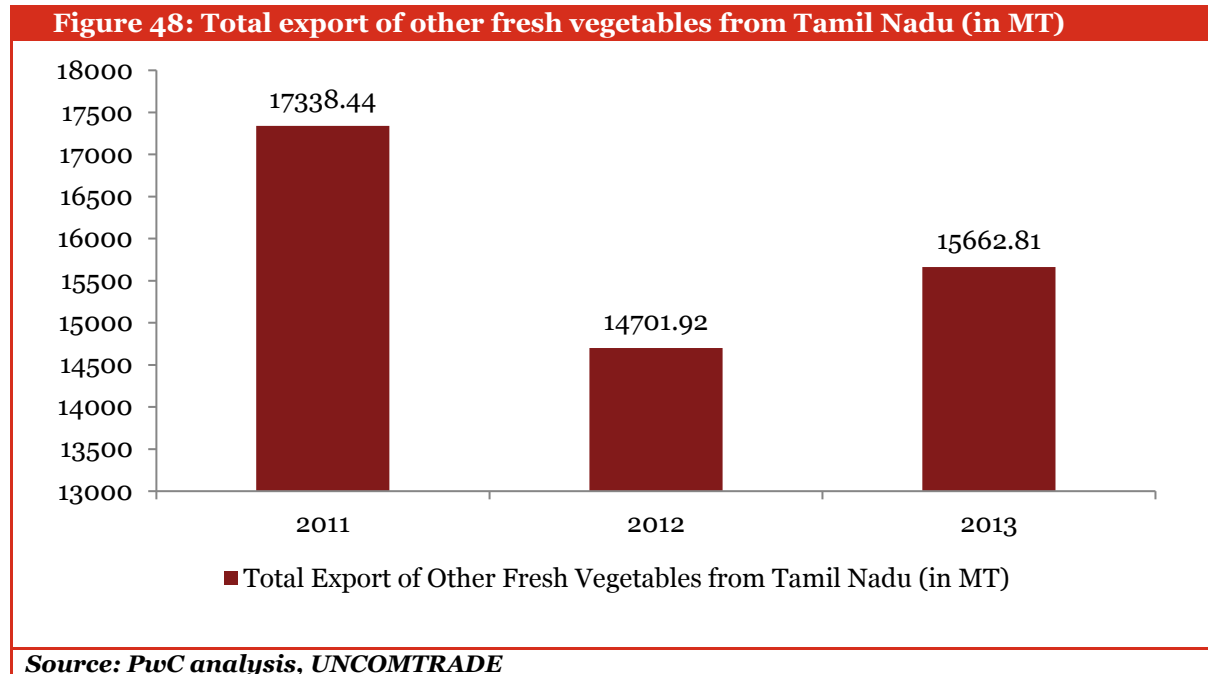
The country has witnessed a tremendous increase in the overall vegetable production, especially during the green revolution. Increasing per capita income, health consciousness, urbanization, increasing working women, shifting of farmers to high value vegetables due to higher income, favourable income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

Tamil Nadu is ranked 8th in terms of the total vegetable production in the country. The state accounts for nearly 3 percent of the area under vegetables in the country and accounts for 5 percent of the total vegetable production of the country. The major vegetable crops of Tamil Nadu are tapioca, onion, tomato, brinjal, okara, gourds, cabbage and drum sticks. These vegetable crops accounts for more than 87 percent of the total area as well as the total production of vegetables.

Tamil Nadu is also known for the exports of tropical vegetables from the state. The tropical vegetables like drum sticks, lady fingers, bottle gourd, snake gourd, bitter melon, snake gourd etc. the export these tropical vegetables are taking place majorly from Chennai and Cochin airports. These terminals generally export vegetables to countries like UAE, Saudi Arabia, Kuwait and other Middle East countries.

The fresh vegetables mentioned above are mainly exported from Chennai and Cochin airport. They are not exported through ships as their shelf life is not long enough to be exported through ships. The general trend of export of these vegetables from Tamil Nadu is illustrated below:



The production centers for these fresh vegetables in the state are shown below:

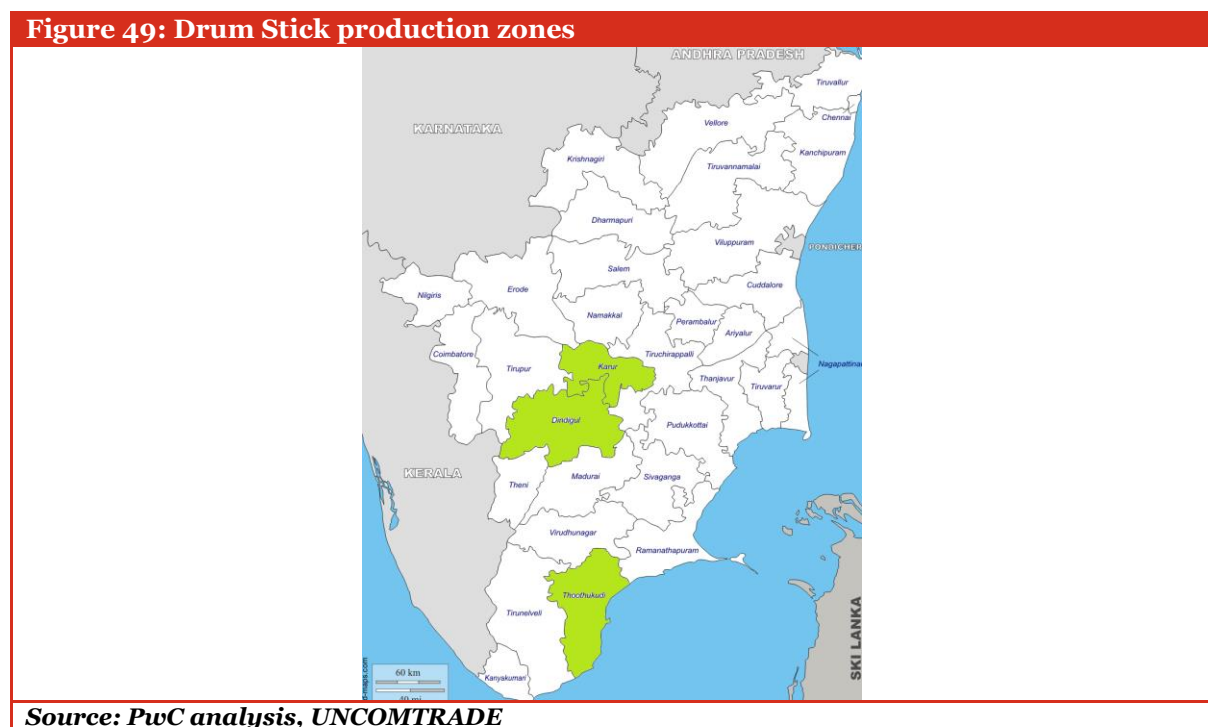
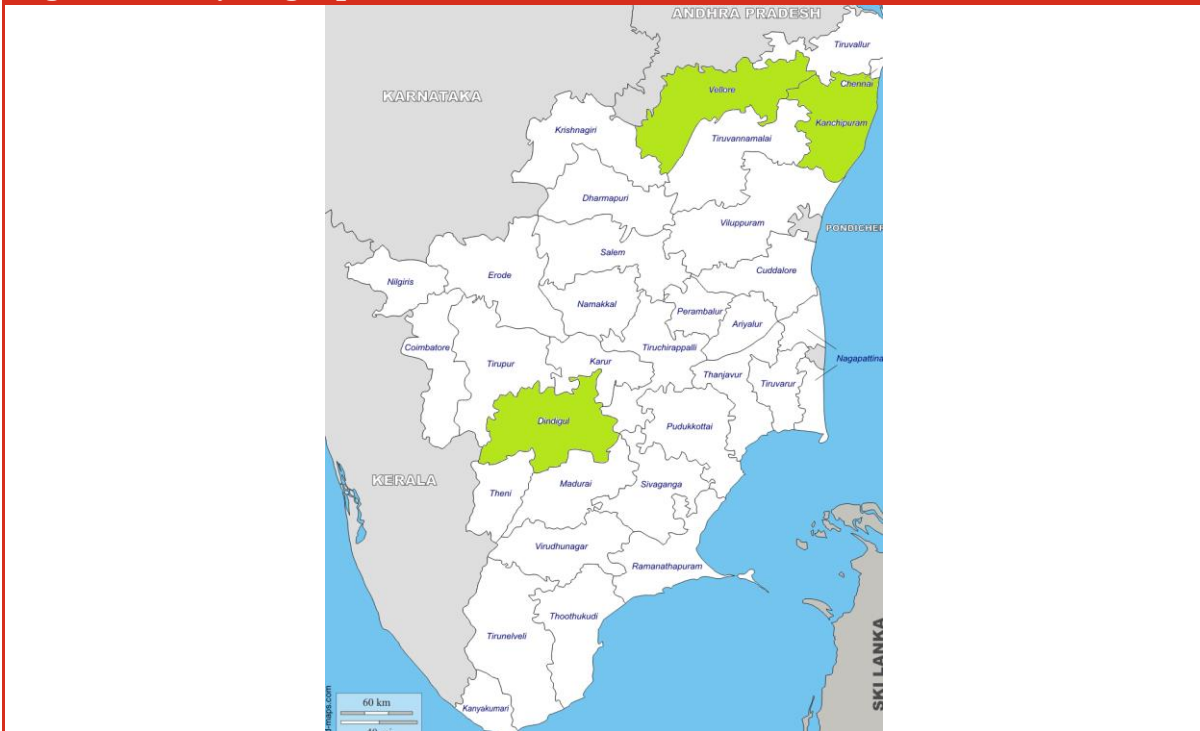
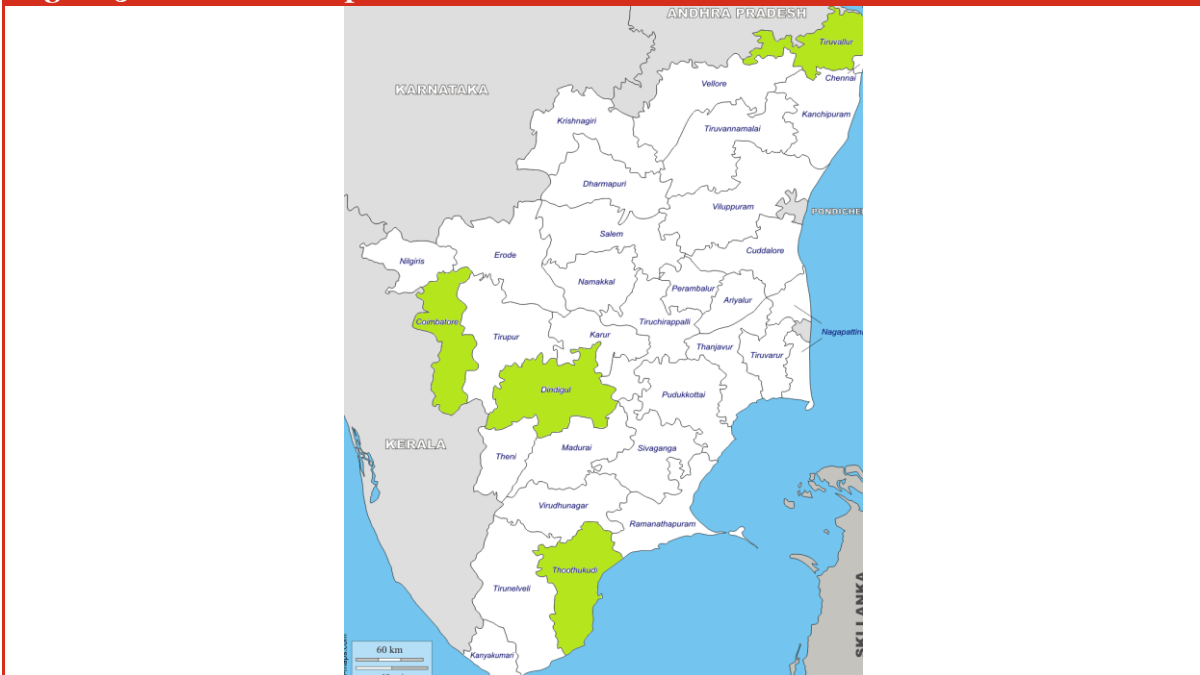


Figure 50: Lady Finger production zones



Source: PwC analysis, UNCOMTRADE

Figure 51: Bottle Gourd production zones



Source: PwC analysis, UNCOMTRADE

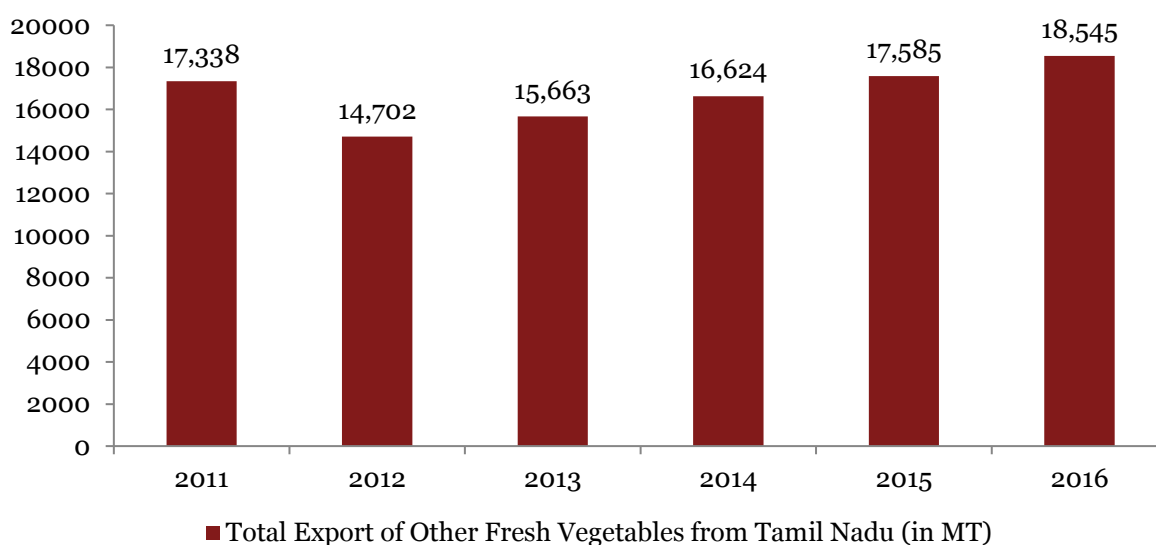
The export of these vegetable are projected over the years in order to assess the future requirement of the infrastructure. As these vegetable are highly perishable they are exported through air freight on

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priority basis. They are exported out of the country and reached their destination within one day of the procurement. The problem arises during summers when due to extreme weather conditions the moisture content present in the vegetables gets lost and therefore there is a loss in the overall quality and weight of the consignment.

Therefore in order to maintain the quality of the fresh produce in summer season we need refer vans to transport the fresh vegetables from procurement center to the pack house and from pack houses to the CPC's at the airport. The current and the project exports of some of the fresh vegetables are illustrated below:

Figure 52: Projected Export from Tamil Nadu



Source: PwC analysis, UNCOMTRADE

The above three graphs clearly indicated that there is a need to create additional infrastructure facility which could handle the rising volume of the crops to be exported. The rising quality needs to be properly addressed through precooling infrastructure and pack houses near to the procurement center so that the losses are minimal. Therefore we need a pack house integrated with pre cooling facility which could cater to 18545 MT of fresh vegetables. The production is in Krishanagiri and Theni cluster, therefore we propose two pack houses in these districts which could cater to the requirement of the exporters.

4.3.6. Summary of Infrastructure required in Tamil Nadu

In the previous section we have discussed the potential of the state in terms of availability of the exportable commodities. It has been observed that the current status of the exports from the state is minimal when compared to the total potential available with the state to export. The huge gap in exports is due to unavailability of the supporting infrastructure to promote exports of the commodities. Good infrastructure facilities ensure the proper delivery and safety of the exported product along with savings in time and cost.

In Tamil Nadu it has been observed that the major commodities having potential for export are banana, egg, chicken meat, maize, tapioca, sapota, gooseberry, vegetables like drumstick, lady finger (okara) and bottle gourd. Although these commodities are already being exported from the state but due to lack of infrastructure their actual potential has yet to be achieved. The infrastructure gaps are present in the form of non-availability of pack houses, over utilized pack houses, non-availability of refer vans for transportation of perishable commodities, non-availability of refer containers for transport of commodities to sea ports, pre-cooling facilities, processing facilities etc. In order to enhance the overall export from the state and realize actual export potential of the state, these gaps has to be plugged.

In the same regards, we have identified various districts based on their respective production strength, proximity the port, existing market and infrastructure availability for exports, connectivity and their potential for further development.

4.3.6.1. Exit Points for Tamil Nadu

The exit options for export products from Karnataka are Chennai – Sea and Air port, Cochin Sea Port and Bangalore Airport. Tuticorin Sea Port is also an exit option used by exporters.

Developing infrastructure around Chennai and Tuticorin

1. Dedicated berth at Chennai port – Not Feasible
 - a. Dedicated berth needs 1.3 million containers per annum to be viable while food container traffic is limited to about 0.2 million containers only
 - b. For a dedicated berth, a ship needs to take its entire cargo from the same berth and food / refer container shipments are not large enough to meet that requirement
2. Development of Infrastructure around Chennai port – not Feasible
 - a. There are over 60 ICDs/CFCs catering to goods moving through Chennai port, adding additional facilities would be un-necessary
3. Development of facilities around Tuticorin Port – Not feasible
 - a. Shipping frequency is low and the exporter may not find it possible to ship significant volumes
 - b. The port has low draft therefore large ship cannot be berthed there
 - c. International logistics is volume driven and using small ships is not viable therefore the exports have to go through large ports and be shipped by largest ships possible

An ICD has been recommended at Theni though at present there is no viability, because it is deemed essential for development of trade. This ICD needs to be connected to Cochin, Chennai and Tuticorin through conventional i.e. road and where feasible through rails.

4.3.6.2. Existing Infrastructure

4.3.6.2.1. Pack Houses

Tamil Nadu has only 4 pack houses (3 at the time study and 1 recently added) that are APEDA recognized pack houses and while the utilisation of the pack houses are not tracked even by the owners (because capacity varies with crop), yet the stakeholders interviewed were of the view that utilisation will not be less than 80-85% as the pack house are used for various crops round the year.

4.3.6.2.2. Cold Stores

There are 136 cold stores in Tamil Nadu. Though as usual the utilisation is low or seasonal there no non-functional cold stores in Tamil Nadu. It is estimated by stake holders that the utilisation would be in the range of 60-65% and in some cases even 70%. The cold stores in Tamil Nadu are performing better on account marine, milk and animal products which are less seasonal than fruits and vegetables. In addition, cold storage increases the life of these products much more than it does for fruits and vegetables. In Namakkal 2 new cold stores have been recommended based on both projected growth in egg exports and also based on demand from stakeholders. However, there project feasibility has to be studied before actually approving a project.

4.3.6.2.3. Food parks in Tamil Nadu

There are no food parks in Tamil Nadu, though innovations in processed foods have been going on. A food processing incubation center could have been recommended but one such facility is already under implementation under the private sector, therefore it has not been included.

4.3.6.2.4. Innovative technologies

Technological innovations seen elsewhere are not easy to adopt for the Indian market due to the fragmented farm holdings and the limited investment capacity in India. A case in the point is the example of overhead conveyor cables for transportation bananas, a very successful innovation in Philippines is effective there due to the large size of the holdings and not applicable in the Indian setting because of the small farms. However, in the recommendations gamma irradiation facilities have been included as it is not affected by farm sizes and more over for the Indian system it is able to address some of the Sanitary and Phyto-Sanitary issues.

4.3.6.2.5. 3rd Party Logistics

In India, there are a lot of third party logistics providers. 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 India. In addition to these, Shipping Corporation of India and Container Corporation of India are the two prominent public sector shipping and logistics players.

Based on exportable surplus estimated in the crop specific sections, the details of the proposed infrastructure along with the proposed capacities and estimated investment in the identified districts are provided below:

Sr. No	Location	Districts covered	Commodity Identified	Seasonality	Quantity currently exported (in 000 MT)	Potential quantity that can be exported (in 000 MT)	Per day Capacity of infrastructure required	Infra-structure required	Units required in future
1	Theni	Coimbatore, Dindigul, Madurai, Virudhnagar, Tirunelveli, Pudukkottai, Tiruchirappalli	Banana	All year	7.7	25.07	58 MT	Pack House ¹⁹	1
2	Dindigul	Kurur, Thoothukudi, Dindigul	Other vegetables (like drumstick, bottle gourd, snake gourd, okara, capsicum, bitter gourd and lablab beans)	All year	11.94	13.14	44 MT	Pack House	1
3	Nammakkal		Egg	All year	1641**	3281**	5 lakh eggs 5000 MT	Refer Containers ²⁰ Cold Store	15 2
4	Tirupur		Chicken Meat	All Year	NR	NR	NR	Irradiation Facility ²¹	2
5	Erode		Maize Tapioca	June-October December-February	NA NA	10207 58685	40 MT 234.7 MT	Starch Unit	1
6	Krishnagiri		Other vegetables (like drumstick, bottle gourd, snake gourd, okra, capsicum, bitter gourd & lablab beans)	All year	3.71	4.08	13.62 MT	Pack house	1

¹⁹ The installed capacity of each pack house/day is 60 MT

²⁰ The capacity of the each 40 ft refer container is 472320 eggs

²¹ The capacity of the irradiation facility will be 10 MT/hr.

** The quantity is defined in lakh nos.

The capacity and the estimated cost of each of the identified infrastructure is given below:

Table 17: Capacity and the estimated cost of each of the identified infrastructure

Sr. No	Location	Proposed Infrastructure	Capacity of the proposed infrastructure	Estimated cost (in lakh)
1	Theni	Pack House	60 MT*	700
2	Dindigul	Pack House	60 MT*	700
3	Namakkal	Refer Containers	10 MT/container	750
		Cold Store	5000 MT x 2	800
4	Erode	Starch Processing Unit	300 MT/day	9000
5	Krishnagiri	Pack House	60 MT*	700
6	Theni	ICD		15000
Total				27,650

*Installed capacity/day

ICD in Theni may not be viable in the beginning. In an ICD to attract a container train operator, minimum non-reefer container traffic should be 22 FEUs per train trip and at least 2 trips, which translate to 44 FEU per week i.e. equivalent to 90 TEU. At present the volume we can project is about 35 FEU per week, so there is viability gap of 10 FEU.

ICD at Theni needs to be connected by rail to Chennai, Tuticorin and Kochi/Cochin sea ports. Setting up a CFS at Tuticorin may not be acceptable to the exporters because the choice of port is not always under the exporters' control. So, therefore, the ICD should connect them to all major ports from where they can ship their goods.

However, when planning for developmental infrastructure, viability of a project ab initio cannot be taken as a necessary condition. So it is recommended, that even if viability is not there at present this project should be explored through PPP route. The investment mode should be exclusively PPP mode so that there is professional management and proper and sufficient marketing support.

The basic rationale for the ICD is that moving goods from the production cluster to the requisite port has to be faster and smoother to improve trade volume. Increased volume of trade is likely to become possible when the logistic linkage improves. Apart from this, ICD can be used for other non-agri products also.

4.3.7. Initial Basic Feasibility of the Infrastructure proposed

The focus of the study was identifying the infrastructure requirements over 2 states and all possible value chain 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.

4.3.7.1. Theni

At Theni, One Pack house has been proposed which will cater to exportable surplus for Banana crop. The exportable surplus quantity is calculated to be 58 MT/day. The potential quantity that can be exported is 25700 MT, quantity currently being exported is 7700 MT. Surplus available for export will

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be 18000 MT (25700-7700). The seasonality of Banana crop is 300 days, therefore per day surplus comes out to be 58 MT/day.

4.3.7.1.1. Capacity utilization and competition

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 97%, if it is assumed that it will be fully utilized to its capacity. Currently there are no APEDA approved pack houses at Theni, therefore there will be no competition to this new pack house that is being proposed.

4.3.7.1.2. Location

Location should consider factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on availability of land at a particular location. Banana for export from Theni can be transported through various ports depending on the export location. Approximate distance of Theni from: Chennai is 509 km, Kochi is 190 km away and Tuticorin is 212 km.

4.3.7.2. Dindigul

At Dindigul, improvements in the existing pack house have been suggested.

The exportable surplus quantity is calculated to be 44 MT/day. The potential quantity that can be exported is 13140 MT, quantity currently being exported is 11940 MT. The seasonality for other fresh vegetables is 300 days, therefore per day surplus comes out to be 44MT/day.

4.3.7.2.1. Capacity utilization and competition

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 73%, if it is assumed that it will be fully utilized to its capacity. However there is one APEDA approved pack house already at Dindigul for fruits and vegetables. Therefore it is suggested that instead of a new pack house the improvements may be planned.

4.3.7.2.2. Location

Location considers factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on availability of land at a particular location. Other fresh vegetable for export from Dindigul can be transported through various ports depending on the export location. Approximate distance of Dindigul from: Chennai is 431 km, Kochi is 196 km away and Tuticorin is 210 km.

4.3.7.3. Erode

A Starch unit has been proposed at Erode, with the raw starch being sourced from Maize and Tapioca. The demand for modified starch is expected to grow at 4.1% from 2013 to 2018.²² The functions of starch in food, feed, and non-food industry includes flocculation, binding water, film-forming properties, adhesiveness, improvement of pH stability, acidic stability, thickening, increase of shear stability, process tolerance, and many more properties. These are the special characteristics of modified starch that makes it useful in various industries.

²² <http://www.prnewswire.com/news-releases/modified-starch-market-by-raw-material-corn-tapioca-potato-wheat-and-others-by-application-food-feed-and-non-food---global-trends--forecasts-to-2018-257247381.html>

4.3.7.3.1. Location

Location should consider factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on availability of land at a particular location.

Erode is located 426 km from Ennore, 409 km from Chennai, 349 km away from Tuticorin, 456 km from Mangalore and 286 km from Kochi.

4.3.7.4. Krishnagiri

At Krishnagiri, One Pack house has been proposed which will cater to exportable surplus for other fresh vegetables.

The exportable surplus quantity is calculated to be 14 MT/day. The potential quantity that can be exported is 4080 MT, quantity currently being exported is 3710 MT. For Krishnagiri the surplus is taken 4080 MT as the current quantity being exported is not through a pack house and is done in a remote area. The seasonality for other fresh vegetables is 300 days, therefore per day surplus comes out to be 14 MT/day.

4.3.7.4.1. Capacity utilization and competition

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 23%, if it is assumed that it will be fully utilized to its capacity. There is no APEDA approved pack house at Krishnagiri for fruits and vegetables.

However given that the capacity utilization is less than 50% for the category other fresh vegetables, and no pack house is present it can also be used for other commodities in the region.

4.3.7.4.2. Location

Location should consider factors such as hinterland connectivity, road connectivity and connectivity to ports for export, and not solely based on availability of land at a particular location.

Other fresh vegetable for export from Krishnagiri can be transported through various ports depending on the export location. Approximate distance of Krishnagiri from: Chennai is 256 km, Kochi is 463 km away, Tuticorin is 492 km, Mangalore lies at 475 km and Ennore is 274 km away.

4.3.7.5. Nammakkal

At Nammakkal, fifteen reefer containers have been proposed for a month.

The current quantity of eggs being exported are 1641 lakh numbers, the projected potential is 3281 lakh numbers. Therefore the additional numbers of eggs that can be exported are 1640 lakh numbers.

4.3.7.5.1. Capacity Utilization

Capacity of a 40 feet refer container is approximately 5 lakh eggs per day. For 1640 lakh number of surplus eggs, the surplus per day comes out to be 5 lakh eggs per day. (Exportable surplus: 1640 lakh numbers, and eggs are produced round the year: 300 days)

One refer container can transport the eggs to export destinations of India, mainly Afghanistan, Oman, Maldives and Pakistan, and return to Indian ports in 2 days. Therefore 15 refer containers will be required for a month.

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4.3.7.5.2. Location

The reefer containers have been proposed to be located at Nammakkal, where they would be directly transported to the exporting ports. Nammakkal is located 408 km from Ennore, 392 km from Chennai, 329 km away from Tuticorin, 633 km from Mangalore and 332 km from Kochi.

4.3.7.6. Revised cost estimates

The study findings were further rationalised with inputs from stakeholders to propose the following revised list of proposed facilities with revised cost estimates.

Table 18: Revised list of proposed infrastructure with cost estimates

Sr. No	Location	Proposed Infrastructure	Capacity of the proposed infrastructure	No. of units proposed	Estimated cost (in lakh)
1	Theni	Pack House	60 MT*	1	700
		ICD	-	1	15000
2	Namakkal	Refer Containers	10 MT/container		750
		Cold Store	1000 MT	2	800
3	Erode	Starch Processing Unit	300 MT/day	1	9000
4	Krishnagiri	Pack House	60 MT*	1	700
Total					26,950

*Installed capacity/day

5. Assessment of Exit Point Infrastructure

5.1. 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:

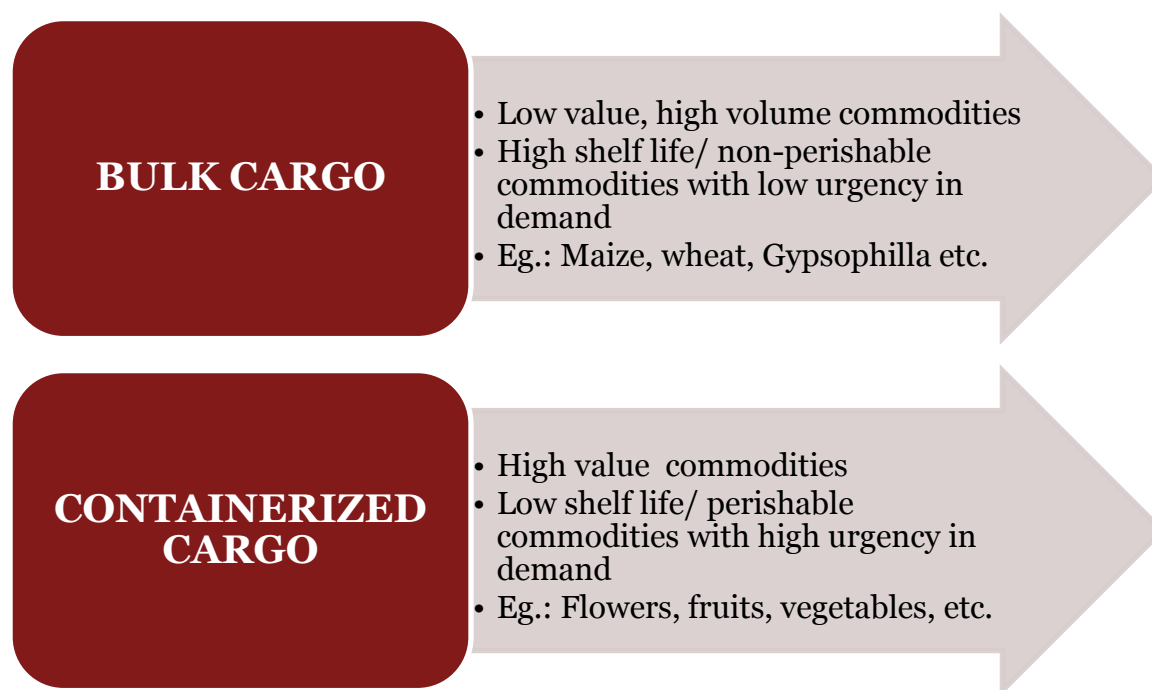


Figure 53: Methods of cargo handling of agricultural commodities for export purposes

5.1.1.1. 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)²³. The salinity

²³ 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.

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.

5.1.1.1.1. 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 mechanically propelled, and mechanically or electrically 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

5.1.1.2. 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.

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:

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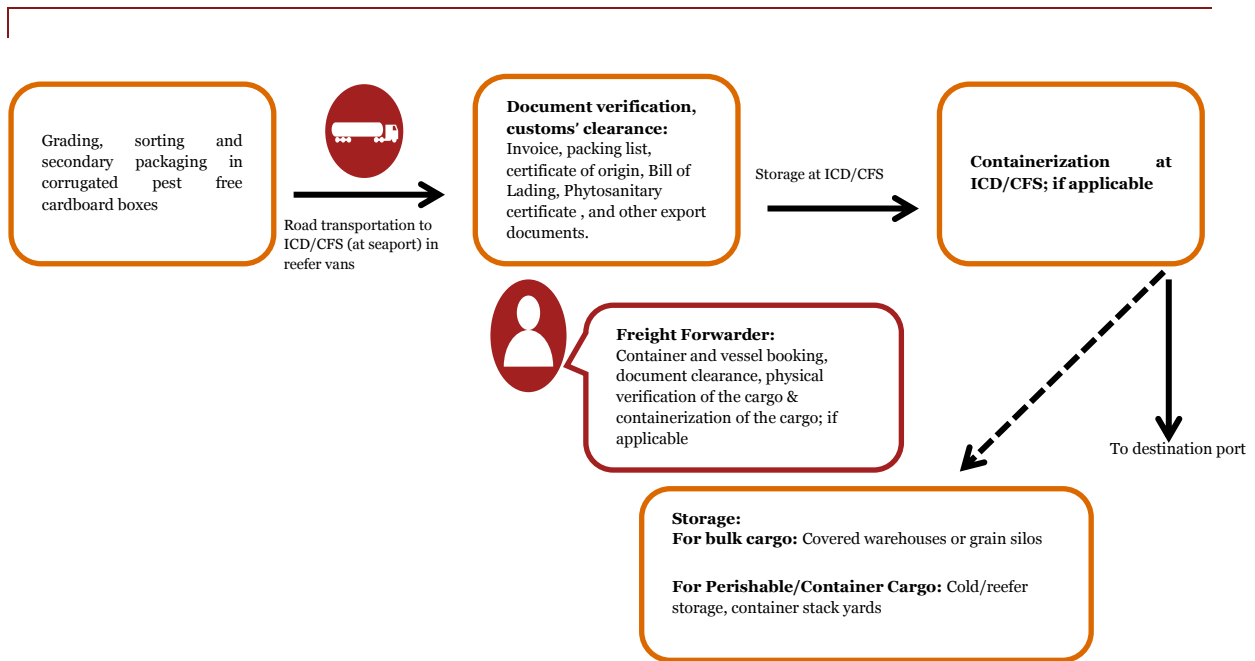


Figure 54 Typical process flow for transporting cargo (both bulk and containerized) by sea freight

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:

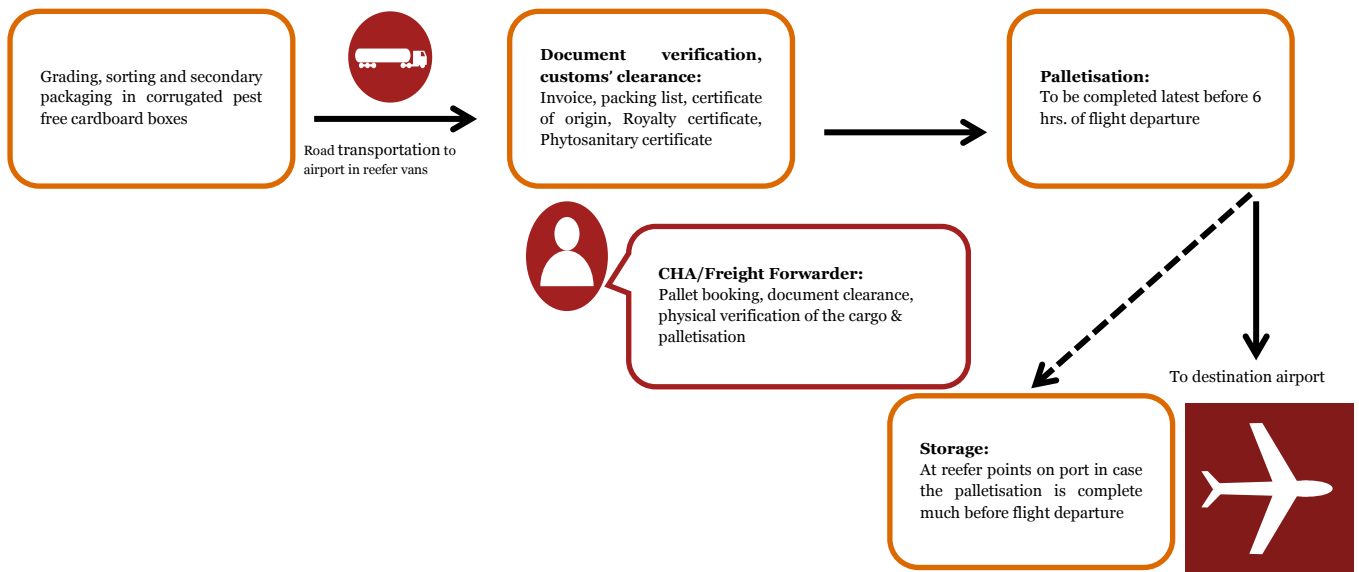


Figure 55: Typical process flow for transporting cargo by air freight

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.

5.1.1.2.1. 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:

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- 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.

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.

5. 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 Phytosanitary and quality inspection laboratories to ensure physical inspection of produce under a continuous, controlled temperature zone.

5.1.2. 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 sea ports and airports was done. Infrastructure requirements at exit points were assessed with focus on select commodities from the focus states of Tamil Nadu & Karnataka 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 and sea ports from Southern India are evaluated under this study. 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 19: At select Sea Ports

FOR BULK CARGO									
1. Storage Facilities									
Kakinada Port	New Mangalore Port	Chennai Port	Cochin Port	Krishnapatnam Port	Tuticorin (VO Chidambaranar Port)	JNPT/Nhava Sheva Port	Marmugao Port	Ennore (Kamarajar Port Ltd.)	
Data not available	a) 2 transit sheds (10000 MT & 4000 MT), 3 overflow sheds (two 8000 MT & one 8830 MT) b) 6 open stack yards (total area = 98391 sq.m) c) 12 covered warehouses (5 port trust {4000-7000 MT}, 4 CWC {4000 MT each; one used as a CFS}, 3 private {4000 MT each, 2 dedicated to coffee})	CT yard capacity:19710 & 27120 Tonnes	Covered area (transit sheds & overflow sheds) = 42360 sq. m, 10 wharfs, 1 CFS (Mattanchery, Ernakulam wharf) Covered warehouses: 7, 2 wharfs, 1 godown and 1 BTP, total area = 21780 sq. m. Total available: 38905 sq.m.	2 dedicated Ags (closed) (16500 & 5000 MT)	a) 6 transit/overflow sheds (2 port owned 10,800 sq.mtrs., 4 private {10000-15000 MT capacity; for liquid cargo) b) Open stack yards (1 port owned 5,53,000 sq.mt., 8 private for liquid cargo: oil, LPG, POL, etc.) c) 14 WHs (4 port owned, 10 CWC owned for VCM cargo)	Data not available	a) Covered storage: 7 port owned (47497.26 T capacity each, 24985.35 sq. m area), 4 FCI/CWC owned (22216 T, 14480 sq. m b) Open stackyards for containers: 14823 sq. m area, 862 TEUs/11830.95 Tonnes c) Open storage for other cargo: 292895.09 T capacity, 131681 sq. m area	2 open stack yards for coal	

2. Marine Infrastructure:								
Kakinada Port	New Mangalore Port	Chennai Port	Cochin Port	Krishnapatnam Port	Tuticorin (VO Chidambaranar Port)	JNPT/Nhava Sheva Port	Marmugao Port	Ennore (Kamarajar Port Ltd.)
Part of a Special Economic Zone and a proposed “Petroleum, Chemical and Petrochemical Investment Region”	15 berths with total capacity of 76.77 Mn tons	24 berths, incl. 7 CT berths	10 general cargo berths and 1 for fertilizers , 2 jetties (for liquid cargo)	10 operational berths	Data not available	Shallow draught berth: Feeder Container Vessels, Cement , General cargo and liquid cargo vessels are being handled with a capacity of about 1.2 million tonnes per annum.	Data not available	5 berths (2 handle thermal coal, 1 automobiles, others POL/liquid cargo)

LEGEND:

CT: Container Terminal, TEUs: Twenty Feet Equivalent Units, POL: Petroleum, Oil, & Lubricants

FOR CONTAINERIZED CARGO								
Kakinada Port	New Mangalore Port	Chennai Port	Cochin Port	Krishnapatnam Port	Tuticorin (VO Chidambaranar Port)	JNPT/Nhava Sheva Port	Marmugao Port	Ennore (Kamarajar Port Ltd.)
1. Container Handling Capabilities (Terminals & Cargo handled):								
Modern container terminal is proposed, to become operational in 2015	Well equipped to handle bulk, liquid chemicals, hazardous cargoes, crude and POL products, heavy lifts, machinery, containers Handles exports of gherkins, maize, rice, cashew, sugar, coffee, etc.	3 dedicated CTs (7 berths in total) More than 70% container cargo: Handled 1344757 TEUs in a year (till 12.02.2015) & 644408 TEUs of export	No dedicated CT	1 CT: 4.8 Mn TEUs & 2 operational dedicated berths	1 CT	3 major terminals: JNPCT, NSICT, APM + 1 private terminal (run by DP World Pvt. Ltd.): 1)Jawaharlal Nehru Port Container Terminal (JNPCT): Three berths (Linear quay length of 680 Metres), Can handle third generation container vessels, 36,000 TEUs capacity with additional paved area: 1,80,000 square metres 320 numbers.(with power backup facility) 2)Nhava Sheva International Container Terminal (NSICT): 672 reefer points, Current capacity: 15.6 million tonnes per year 3) Gateway Terminals India (GTI) No reefer cargo handling points, mainly deals in container cargo of non-perishable commodities Container handling capacity: 1.3 Mil TEUs per annum 4.16 million TEUs handled in FY 2013-14: 55.74% of the container traffic handled by the Major Ports - 1st position in container handling among Major Ports	0.08 Mn T export container cargo in 2010-11	3 CTs

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Kakinada Port	New Mangalore Port	Chennai Port	Cochin Port	Krishnapatnam Port	Tuticorin (VO Chidambaranar Port)	JNPT/Nhava Sheva Port	Marmugao Port	Ennore (Kamarajar Port Ltd.)
1. Container Cargo Handled:								
		Handled 122441 TEUs/2363000 Tonnes container cargo in Jan. 2015 (1119000 T exports & 1244000 T imports)		Handles: Export cargo for Maize, chillies, mango pulp, onions, rice, shrimps, sugar & tobacco Import cargo for apples, coffee, fish, chillies, pulses, oranges, etc.		The Port handled 62.35 million tonnes of total cargo during 2013-14 as against 64.49 million tonnes during the previous year. Of the total share of containerised cargo: 55.24 million tonnes (88.59 per cent), liquid cargo was 6.29 million tonnes (10.10 per cent) and the remaining 0.82 million tonnes (1.31 per cent) was miscellaneous types of dry bulk and break-bulk cargo	Handled exports for Fish, gherkins, cashew, etc.	Majorly handles coal, POL, automobiles and liquid cargo Out of 27.34 Mn T cargo traffic, 22.49 MT was coal, 2.43 POL, 2.42 MT was others (incl. Containerized cargo and other bulk cargo) (2013-14)
2. No. of Reefer Points:								
Data not available		360	NA	400 + 20 (@ CFS)	84	992	84	NA
3. CFS Space:								
Data not available	1 CFS	Not available currently. However, availability of good transportation services and linkages is evident. Trains to	NA	one CFS, 6000 TEUs, 48 acres area (provision to expand upto 300 acres)		30 in operation, 6 in process	Data not available	NA

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ICD with daily departures

Kakinada Port	New Mangalore Port	Chennai Port	Cochin Port	Krishnapatnam Port	Tuticorin (VO Chidambaranar Port)	JNPT/Nhava Sheva Port	Marmugao Port	Ennore (Kamarajar Port Ltd.)
4. Cargo handling facilities								
Data not available	can handle upto 64 tons, one 75 T mobile crane	Three 10 Ton mobile cranes, 14 locos (12 of 700 HP and remaining 1400 HP), 10 quay cranes	NA	20 quay cranes (super post panamax)	3 quay cranes, trailers, loco, trailer trucks	Quay cranes, Gantry cranes, reach stackers, trailers available at each CT	2 reach stackers: 40 T each, 2 loco 1400 HP	Data not available

LEGEND:

CT: Container Terminal

TEUs: Twenty Feet Equivalent Units

POL: Petroleum, Oil, & Lubricants

Table 20: At select Airports

	Bengaluru airport	Mumbai Airport	Chennai Airport
1. Sectors covered	Singapore, Sri Lanka, Germany, Qatar, The Netherlands, UAE	China, US, UK, Japan, Malaysia, Iran, Kenya, Ethiopia, Qatar, France, Switzerland, Saudi Arabia, Turkey, Mauritius, UK, Thailand	UAE, Qatar, Japan, Korea, Saudi Arabia, Malaysia, Thailand, Singapore, France, UK, Sri Lanka
2. Container Terminal/ Air Cargo Complex/Terminal	<p>1) AISATS(joint venture (JV) between Air India and Singapore Air Terminal Services) owns a 4-level cargo terminal in Bengaluru airport. The terminal has a total gross floor area of 20,000 sqm, designed to handle over 200,000 tonnes of cargo per annum. The terminal was proposed recently, however, the project is no longer operational</p> <p>2) Menzies Aviation Bobba (B'lore) Pvt Ltd, (MABBPL) has been awarded the concession by Bengaluru International Airport Ltd (BIAL) to build and operate the Cargo Terminal at the Bangalore International Airport, Devanahalli for a period of 15 years till 2023</p>	Dedicated Cargo terminal, MIAL Cargo	Dedicated Air Cargo Terminal
3. Container Cargo handling capabilities	<p>The terminal has a maximum capacity to handle 280000 tons of cargo annually.</p> <p>Will handle the International cargo (Export, Import) carried by international airlines operating out of Bangalore- Lufthansa Cargo, Aero Logic, DHL, Kalitta Air, Air Asia, Air France Cargo , British Airways World Cargo, Thai Airways, Gulf Airlines, Oman Air, Qatar Airlines, Kingfisher Airlines and Blue Dart. MABBPL will also handle Domestic cargo carried by Domestic Airlines</p>	Details not available	<p>Forklifts, mass stackers, trolleys, etc. Can handle container load from 3 to 12 MT</p> <p>As on date, on an average 720 MT (Export 350 MT and Import 370 MT) is being handled on a daily basis at Chennai Air Cargo Complex.</p>

		The airport handled 242,246 metric tonnes of cargo in 2013-14	
4. Storage Capacity	No	<ul style="list-style-type: none"> a) Trans-shipment cargo storage facility b. Cold Storage: Export state-of-the-art b) Perishable Centre: Temp. range: +15 to +25 °C, +2 to +8 °C, 0 to -10 °C , One time holding capacity: 160 Tons, Annual Handling capacity: 50,000 Tons c) Cold Storage: Temp. range: +15 to +25 °C, +2 to +8 °C, One time holding capacity: 120 Tons, Annual Handling capacity: 30,000 Tons 	Yes, capacity details not available
5. Port Infrastructure	Accredited phytosanitary labs and quality inspection agencies are required on-site to ensure on-site physical verification of cargo.	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	on- site customs' clearance and physical verification facilities available
6. CFS Space	Not available	Not available	Not available

7. Cargo handling equipment/facilities	Owned by airline	Owned by airline	Owned by airline
8. CPCs	No, but required	Yes, increase in capacity required	Centre for perishable cargo storage facility with a holding capacity of 40 MT

LEGEND:

CPCs: Center for Perishable Cargo; ICDs: Inland Container Depot; CFS: Container Freight Station

5.1.3. Key Inferences

1. In order to promote agri exports Karnataka & Tamil Nadu, it is necessary to focus on major export destinations/sectors where agricultural products from these states are in demand or have future demand potential since:
 - a. Choice of port for a given commodity depends on destination market, nature of commodity, type of cargo and preference of the buyer in terms of demand urgency, lead times, packaging preferences and quality of the product.
 - b. Type of cargo traffic (bulk or container cargo) is defined by ports' cargo handling capabilities in terms of port infrastructure availability and capacity to handle container traffic and not by proximity to production centers or export hubs.
2. Assessment of port infrastructure was done for select ports - JNPT/Nhava Shewa, Marmugao, New Mangalore, Cochin/Kochi, Chennai and Tuticorin. These ports were selected on the following basis:
 - a. Volume of agri export cargo handled by each port on annual basis
 - b. Availability of suitable infrastructure at ports and hinterland connectivity to undertake agri –commodity exports
 - c. Export destinations catered by these ports
3. On the basis of our analysis, the major sea ports handling agri commodities are JNPT, Cochin/Kochi & New Mangalore port on the west coast and Chennai & Tuticorin ports on the east coast.
 - a. Export volumes of agri commodities are miniscule and spread sporadically throughout the year. Considering the low export volumes of agri commodities at other ports and their limited infrastructural capabilities, there is little scope to further build these ports to attract export cargo for agricultural commodities.
 - i. Marmugao predominantly is an iron ore export port, with iron ore exports holding a 62% share in the total cargo handled by the port in 2013-14 (Refer Appendix B.1.1 for more details)
 - ii. Only agricultural commodity exported from the Karwar port in 2013-14 was Maize and it was all as bulk cargo.
4. JNPT, New Mangalore, Cochin/Kochi on the West Coast and Tuticorin & Chennai ports on East Coast have the potential to be further developed for export of agri commodities. Assessment of existing potential and analysis of available avenues to further strengthen the port infrastructure for agri-commodity exports are enumerated below:
 - a) JNPT Port:
 - a. JNPT, on the West coast, has the highest container handling capacity among all major sea ports in India (for details, refer Appendix B.1.1). It handled 59.48 Mn Tons of container cargo in 2013-14, which is 42% of the total container cargo handling capacity of the country. It can handle nearly 45.50 lakh TEUs of container traffic every year, almost 11630 TEUs/day. JNPT port is the preferred port for transport of agricultural commodities to MENA, UK, Japan and France. Both reefer and non-reefer containerized cargo are handled at port.
 - b. However, with changing consumer preferences towards containerized cargo over bulk cargo, there is a need to redevelop the bulk terminal into a container terminal to cater to increased export volumes and container traffic at the port. Additionally, deployment of additional machineries, equipment and port crafts, installation of additional reefer points, upscaling and capacity expansion of existing storage areas (both temperature controlled and ambient) in line with the expected increase in reefer container traffic at the port and development of back up facilities needs to be undertaken to cater this expected increase in container traffic at the port. This capacity up gradation of port

infrastructure can be taken in a PPP mode to overcome project management, time and investment limitations and simultaneously, meeting industry requirements.

b) New Mangalore port :

- a. New Mangalore port is mainly into bulk cargo exports. Almost 65% of the total cargo traffic at New Mangalore port is contributed by POL. Agricultural commodities are generally transported as bulk cargo from the port and constitute to around 10% of the total cargo handled at the port. For details, refer Appendix B.1.1.
- b. The port has strategic geographical importance for Karnataka and the neighboring region with regards to export of agricultural commodities– it caters to all major export markets for agricultural exports from Karnataka such as MENA, UK, France and Japan. Due to limited port infrastructural capabilities to handle container cargo, currently all containerized agricultural exports are sent either via JNPT, Cochin or Chennai port and therefore, attract huge pre shipment internal transportation costs which acts as a huge deterrence for small and medium exporters.

c) Cochin/Kochi Port:

- a. Almost 25% of cargo volume handled at Kochi/Cochin sea port is bulk cargo. Containerized exports include fresh fruits, vegetables and floriculture products (4% of the total cargo volume at the port) (for details, refer Appendix B.1.2). Some of the container cargo is also for bulk building at JNPT/Mumbai port.
- b. In order to ensure quality of exported products for long and to attract more containerized cargo to the port, capacity expansion at port, both container handling capacity and storage capacity, needs to be considered.

d) Chennai Port:

- a. On the East coast, Chennai stood second (after JNPT on west coast) in terms of annual container traffic handled at the port, with annual container handling capacity of 42.45 Mn Tons i.e. 35 lakh TEUs of container traffic every year, almost 9590 TEUs/day (For details, refer Appendix B.1.1).
- b. Similar to JNPT port, the port requires capacity expansion. Deployment of additional reefer points and backup systems, creation of new cold storage units and covered warehouses, creation of additional container berths are quintessential to sustain the projected growth of containerized cargo at the port (expected to grow at 10.5% p.a.) (Refer Appendix B.1.1 & B.1.2).

e) Tuticorin port:

- a. Though a minor port, it is strategically important for Tamil Nadu and can also be explored for export markets in South East Asia for agri exports from Tamil Nadu and Karnataka viz. Sri Lanka, Malaysia, Thailand, Singapore, etc.
- b. Tuticorin, with only 9.83 Mn Tons of annual cargo handling capacity, is used as a major exit point for various agricultural commodities, both reefer and non-reefer containerized cargo. However, export volumes of containerized cargo catered are negligible. Poultry products, fresh onions, cucumber/gherkins, fresh vegetables and non-basmati rice are major agri commodities exported from the port (Refer Appendix B.1.2 for details).
- c. Considering the limited draft depth (max. draft = 8.25 mtrs.), the port can be used for bulk building container cargo for Chennai port. Alternatively, a dredging expedition to deepen the draft further can also be explored.

- f) An economically viable ICD requires 2 MN TEUs equivalent of non-reefer cargo traffic for an international terminal operator to provide its services. ICDs at New Mangalore and Marmugao port with focus on agricultural commodities may not be viable

considering the volume of cargo handled at these ports. The major traffic handled at Marmugao port is iron ore and POL. It handled 27.50 Mn Tons of iron ore, almost 40% of the iron ore cargo volume handled at all major Indian ports (Refer Appendix B.1.1 for details). New Mangalore has begun handling agricultural commodities and can share the cargo traffic at Nhava Sheva and Cochin sea ports for agricultural commodities in future. The port might require viability gap funding to ensure economical and operational viability of the ICD.

- g) Alternatively, an up gradation of on-site CFS at the ports can also be done so that it can handle a minimum of 22 FEUs of reefer containers and 45 TEUs of non-reefer containers. This is equivalent to 2 trainloads a week, just enough to begin with and attract a train operator to provide hinterland connectivity. Viability gap funding to be evaluated to cater to issues of seasonal nature of cargo traffic and costs of return of empty reefer containers.
 - h) Good hinterland connectivity through rail and road needs to be created with Tuticorin port, Chennai seaport and Kochi port, to facilitate easy in-bound logistics and domestic transportation. This will ensure timely supply and delivery of perishable and time sensitive cargo to and from the neighboring states and regional distribution centers/markets and/or export hubs. This will also provide avenues for the state governments to attract revenues from neighboring states for export and import of perishable cargo by providing adequate infrastructure at major air ports and sea ports in the state.
5. On a similar basis, Chennai, Bengaluru and Mumbai airport were selected for further assessment of existing infrastructure capabilities and potential for further development of the port to cater to the requirements of agri-commodity exports.
 6. Air freight predominantly carries containerized cargo. Bengaluru airport and Chennai airport are the preferred airports for containerized cargo for agri commodities from Tamil Nadu & Karnataka. Since, lead times are a crucial factor for export of perishable agri-commodities, Mumbai airport was only used as a reference point for infrastructure capabilities and is not been considered for further infrastructure capability up gradation/expansion for export of agri commodities from the focus states.

Details of existing infrastructure gaps and requirements to cater agri-commodity exports are given below:

a. Bengaluru airport:

- i. 4341 MT of fresh vegetables were transported from Bengaluru airport last year, representing 46% of the total cargo traffic at the airport. (For details, refer Appendix B.1.3). Floriculture products represented 14% of the total cargo traffic at the airport.
- ii. However, exporters face issues in maintaining the cold chain for flowers during transit. There is an urgent need for a dedicated controlled temperature unit at the airport to facilitate hassle free physical verification, Phytosanitary inspection, document verification, customs' clearance and in-transit storage of perishable cargo at the airport.
- iii. This dedicated unit/Center for Perishable Cargo (CPC) would also provide basic quality inspection and testing facilities at the airport so as to prevent physical damage to cargo due to transportation (loading, unloading, temperature and humidity changes, etc.)

b. Chennai port:

- i. Fresh & dried vegetables, poultry products and fresh mangoes constituted more than 35% of the total cargo traffic from the Chennai port in 2013-14. Fresh & dried/processed vegetables together saw a 73% y-o-y growth from 2012-13. (For details, refer Appendix B.1.3). Capacity availability at Chennai airport's Air Cargo Terminal needs to be evaluated in line with the growth pattern and the expected gush in export cargo from the port. CPC at Kochi

airport can also be explored as a temporary alternative to cater to the increased cargo volumes until the capacity expansion at Chennai airport is not complete.

- c. Feasibility of operating a chartered flight for export of perishable and demand sensitive commodities to key export hubs can also be explored, in conjunction with airport authorities and respective state governments. Minimum tonnage required to viably run such a chartered flight is 50 Tons/flight and maximum load limit is 120 Tons/ flight. Small aircrafts are also available with load capacity of 15-20 Tons approx.. , however, commercial and operational viability of operating such a small aircraft needs to be evaluated with regards to export price differential, available profit margins and industry willingness.
7. Support from respective State governments, in conjunction with guidance and support from the Export Promotion agency, is required to bridge the indicated infrastructure gap, especially to ensure good hinterland connectivity through rail and road transport network and to provide viability gap funding, wherever required to instill investor confidence and attract cargo traffic to the renovated/upgraded ports.

6. Summary

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. **Stage 1 of agriculture** – 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, gherkin exporters, pomegranate 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
2. **Farmer Development and Capacity building** – 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
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 breakfast mixes / cake mixes 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. **Sanitary and Phyto – Sanitary (SPS) issues** – SPS issues are often used as no trade barriers for controlling trade flow and need to be addressed. However SPS issues for each of the crops discussed would be different and would also vary based on location of the production base. One of the suggestions that came through were for having testing facilities in each district or at least converting the laboratories of the universities in these into facilities for testing and certifications. There are 2 constraints that make it unviable, firstly that even to convert an existing facility into a basic level lab (Bio-Safety Level 2) will also entail significant costs (about INR 250 million) and the viability of such a laboratory cannot be established at this stage. Secondly, having a laboratory will not ensure that produce from the farms meet the SPS requirements of every country. In order for more and more farm produce to meet the

requirements it is important to develop an outreach / training programme to educate /sensitize the farmers / traders to the requirements of international SPS and the process changes that they need to adopt in order to meet the global standards. In this context suitable campaigns are needed to increase the number of GAP certified farmers as well as phasing out of hazardous agro chemicals. Most of these activities however would be out of the direct purview of APEDA and would need active support of the local state government as well as national Horticulture Board. So to summarize, in view of the uncertain viability and high cost, BSL 2 labs are not being recommended however it is advisable that efforts be made to improve the farming processes. It may be noted that were feasible, gamma irradiation has been included. Gamma irradiation helps control biological hazards to a certain extent.

Existing Infrastructure and proposed infrastructure

The summary of the infrastructure required for each state is given as the summary of the state specific chapter.

Karnataka – Investment required in Karnataka is INR 140.10 crores for 6 pack houses, 1 pulping unit, 1 starch unit, and a Centre for Perishable Cargo at Bangalore Airport.

Tamil Nadu – The investment required in Tamil Nadu is INR 269.50 Crores for 2 pack houses, refer containers and 2 cold stores, 1 starch unit, and an Inland Container Depot at Theni or in the nearby region.

The structure of partnership for the above mentioned projects would be –

Project	Partnership	Remarks	Funding
Starch Project - Karnataka	PPP	The partners should be private sector players with existing manufacturing operations in corn starch business.	While it is premature to define the funding structure for the projects at this stage, however it can be assumed that APEDA can provide funds to the extent allowed under its schemes and rest will be arranged by the project promoters.
Starch Project - Tamil Nadu	PPP		
Center for Perishable Cargo - Bangalore Airport	PPP	Partner must have experience in managing similar facilities.	
Cold Stores in Namakkal	PPP	Utilisation is key to a cold store therefore the partners must have captive business or experience egg export	
ICD - Tamil Nadu	State Government	Initial stage there will not be viability therefore there may be very limited private sector interest	
Reefer Containers	PPP	Multipurpose use leading to assured initial returns, thereby capable of attracting private investment. Also, require high investment and technical capabilities. State oversight required to boost targeted export growth.	
Mango Pulping Unit	PPP	Partner should have experience in export of mango pulp.	
Pack Houses	Private /State government or any other registered body	These are not difficult to operate and can be managed well all types of partners. For packhouses with capacity utilisation less than 65%, viability gap funding may be required to ensure financial sustainability and economic viability in the initial years.	

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The facilities have been distributed across suitable clusters of the given state. It is not possible to determine the exact location at this stage. The capacities given are for growth in exports and not for covering the existing level of exports.

The list of existing cold stores, Inland Container Depots, Container Freight Stations have been included in the appendix A.7, while infrastructure assessment of all ports and airports have been captured in Appendix B.

Utilization of existing resources as not tracked, however it know that large standalone cold stores are rarely properly utilised, while small cold stores at pack houses have better utilization.

Two Additional infrastructure options –

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

1. **Food Product Incubation center** – A 150,000 square feet incubation center that can support at least 60 start –ups will require an investment of INR 50 crores. This project necessarily must be developed under PPP.
2. **Renewable energy** – Based on the request of floriculturists, we have compiled a cost analysis of powering green houses with renewable energy. The analysis is included in appendix E. the benefit of this arrangement will be in terms increase in production of flowers by about 25% due to extension of the growing period.

Appendix 1 A - Crop Data

Appendix 1 A.A - Export Growth Projections

Appendix 1 A.A.A - fruits and fruit products

	<u>Grape Exports</u> from India ('000 Tons)	<u>Y-o-Y</u> <u>Growth</u> <u>Rate</u>	<u>Papaya</u> Exports from India ('000 Tons)	<u>Y-o-Y</u> <u>Growth</u> <u>Rate</u>	<u>Pomegranate</u> Exports from India ('000 Tons)	<u>Y-o-Y</u> <u>Growth</u> <u>Rate</u>	<u>Mango Pulp</u> Exports from India ('000 Tons)	<u>Y-o-Y</u> <u>Growth</u> <u>Rate</u>
2004	23	0%	3.5	0%			90	
2005	52	130%	6.4	85%			96	7%
2006	65	23%	10.3	61%			135	40%
2007	76	18%	10.9	5%	21.67		157	17%
2008	117	55%	13.8	27%	35.18	62%	167	6%
2009	109	-8%	17.6	27%	34.81	-1%	173	4%
2010	64	-41%	15.4	-12%	33.42	-4%	186	8%
2011	75	17%	18.7	21%	18.21	-45%	170	-9%
2012	114	52%	21.5	15%	30.16	66%	150	-12%
2013	149	30%	23.1	8%	36.03	19%	148	-2%
2014	137	-8%	24.7	7%	31.33	-13%	175	18%
2015	142	3%	26.7	8%	32.39	3%	189	8%

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2016	148	5%	28.3	6%	30.52	-6%	190	0%
2017	155	4%	30.1	6%	31.40	3%	186	-2%
2018	162	4%	32.6	8%	33.08	5%	185	0%
2019	177	9%	34.2	5%	35.47	7%		

Source: UN Comtrade, PwC analysis

Appendix 1 A.A.A - Other Commodities

	<u>Tomato Exports</u> from India ('000 Tons)	<u>Y-o-Y</u> <u>Growth</u> <u>Rate</u>	<u>Gherkin Exports</u> from India ('000 Tons)	<u>Y-o-Y</u> <u>Growth</u> <u>Rate</u>	<u>Flowers Exports</u> from India ('000 Tons)	<u>Y-o-Y</u> <u>Growth</u> <u>Rate</u>	<u>Maize Exports</u> from India ('000 Tons)	<u>Y-o-Y</u> <u>Growth</u> <u>Rate</u>
2003							8	204%
2004					31		23	-42%
2005					28	-9%	13	-4%
2006					35	28%	13	58%
2007					43	20%	20	82%
2008					36	-15%	37	-24%
2009	0.16				31	-15%	28	26%
2010	0.02		263		27	-13%	36	127%
2011	0.23		209	26%	29	8%	81	73%
2012	0.17	-25%	259	-19%	31	7%	140	31%
2013	0.23	33%	239	8%	27	-12%	184	
2014	0.25	8%	219	9%	22	-17%		
2015	0.31	27%	220	0%				
2016	0.31	-1%	223	-2%				
2017	0.37	17%	205	9%				
2018	0.40	8%	202	1%				
2019	0.43	9%	200	1%				

Source: UN Comtrade, PwC analysis

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Table 21: Major gherkin exporters - Global (2013)

Exporting Country	Quantity (in '000 Tons)
India	178
Germany	109
Turkey	72
Netherlands	70
USA	63
Croatia	53
Viet Nam	26
Others	122
Total	692.27

Source: UN Comtrade, PwC analysis

Table 22: Major pineapple import zones in the world (2013)

Importing Region	Qty (in '000 Tons)	% share
N. America	1,092	33%
W. Europe	1,188	36%
E. Europe	281	8%
MENA	232	7%
Far East + China	317	9%
Others	232	7%

Source: UN Comtrade, PwC analysis

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Appendix 1 A.A - Annexure for Banana

Commodity	Type	Years	Production in India (in 000 tonnes)	Total production in Tamil Nadu (in 000 tonnes)	Total exported from India (in 000 tonnes)	Estimated export from Tamil Nadu (in 000 tonnes)	Potential for exports from the state (in 000 tonnes)	Estimated export after discounting (in 000 tonnes)	no of working days	Per day additional capacity requirement (in MT/day)
Banana	Actual	2007	23823.0	6116.5	16.7	5.5	244.7	24.47	300	
		2008	26217.0	6667.0	30.4	10.2	266.7	26.67	300	
		2009	26469.5	5200.0	54.3	14.3	208.0	20.80	300	
		2010	29780.0	8253.0	60.8	23.2	330.1	33.01	300	
		2011	28455.1	6736.4	40.9	13.5	269.5	26.95	300	
		2012	26509.1	5136.2	53.8	14.5	205.4	20.54	300	
		2013	29724.5	5650.0	28.1	7.7	226.0	22.60	300	
	Projection	2014	30178.6	6270.7	50.3	14.8	252.2	25.22	300	
		2015	30902.7	6262.5	52.7	15.3	251.8	25.18	300	
		2016	31626.8	6255.1	55.1	15.9	251.5	25.15	300	
		2017	32350.9	6248.4	57.5	16.4	251.3	25.13	300	
		2018	33075.0	6242.4	60.0	16.9	251.0	25.10	300	
		2019	33799.0	6236.8	62.4	17.4	250.8	25.08	300	58.0

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Appendix 1 A.A - Annexure for Chicken Meat

Commodity	Type	Years	Production in India (in 000 tonnes)	Total production in Tamil Nadu (in 000 tonnes)	Total exported from India (in 000 tonnes)	Estimated export from Tamil Nadu (in 000 tonnes)	Potential for exports from the state (in 000 tonnes)
Chicken Meat	Actual	2007	1755.0	334.0	1.0	0.2	1.4
		2008	1884.0	356.0	1.7	0.4	2.4
		2009	2087.0	397.0	0.8	0.2	12.7
		2011	2483.0	350.0	10.1	1.8	13.5
		2012	2277.9	321.1	5.1	0.9	14.7
		2013	2328.3	328.2	5.5	1.0	13.3
	Projected	2014	2913.5	441.2	7.0	1.3	12.8
		2015	3133.2	438.8	7.6	1.4	11.7
		2016	3353.0	444.8	8.3	1.6	16.7
		2017	3572.7	455.6	8.9	1.7	17.8
		2018	3792.4	451.6	9.6	1.8	19.0
		2019	4012.2	454.2	10.2	2.0	20.2

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Appendix 1 A.A - Annexure for Egg

Commodity	Type	Years	Production in India (in lakh nos)	Total production in Tamil Nadu (in lakh nos)	Total exported from India (in lakh nos)	Estimated export from Tamil Nadu (in lakh nos)	Potential for exports from the state (in lakh nos)	Estimated export after discounting (in lakh nos)	no of working days	Per day additional capacity requirement (in lakh/day)
Egg	Actual	2007	535649	83937	12229	2749	3065			
		2008	555624	88098	9529	2198	3219			
		2009	602671	108476	8793	439	3929			
		2010	630244	115137	3652	960	4175			
		2011	664499	118518	5961	1539	4299			
		2012	664545	118526	6356	1641	4298			
		2013	697310	124370	4888	1121	4513			
	Projected	2014	735261	137777	4026	982	4996			
		2015	764008	145306	3291	860	5267			
		2016	792755	152835	2557	738	5539			
		2017	821502	160364	1823	616	5811			
		2018	850248	167893	1089	494	6082			
		2019	878995	175423	980	372	6354	3282	300	11

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Appendix 1 A.A - Annexure for Maize

Commodity	Type	Years	Production in India (in 000 tonnes)	Total production in Tamil Nadu (in 000 tonnes)	Potential for processing from the state (in 000 tonnes)	Estimated quantity processed after discounting (in 000 tonnes)	no of working days	Per day additional capacity requirement (in MT/day)
Maize	Actual	2007	18955.4	810.6	27.6			
		2008	19731.4	1257.8	42.8			
		2009	16719.5	1144.3	38.9			
		2010	21725.8	1027.5	34.9			
		2011	21759.4	1695.5	57.6			
		2012	21058.4	1829.9	62.2			
	Projected	2013	22152.2	1923.5	65.4			
		2014	22769.5	2103.3	71.5			
		2015	23386.7	2283.1	77.6			
		2016	24004.0	2462.9	83.7			
		2017	24621.3	2642.7	89.8			
		2018	25238.6	2822.5	96.0			
		2019	25855.9	3002.3	102.1	10.2	250	40.8

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Appendix 1 A.A - Annexure for Tapioca

Commodity	Type	Years	Production in India (in 000 tonnes)	Total production in Tamil Nadu (in 000 tonnes)	Potential for processing from the state (in 000 tonnes)	Estimated quantity processed after discounting (in 000 tonnes)	no of working days	Per day additional capacity requirement (in MT/day)
Tapioca	Actual	2010	8076.0	5522.7	220.9			
		2011	8746.5	5964.5	238.6			
		2012	7236.6	4523.2	180.9			
		2013	8139.4	4975.6	199.0			
	Projected	2014	7719.7	4475.8	179.0			
		2015	7587.8	4167.6	166.7			
		2016	7455.8	3859.3	154.4			
		2017	7323.8	3551.0	142.0			
		2018	7191.9	3242.8	129.7			
		2019	7059.9	2934.5	117.4	58.685	250	234.7

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Appendix 1 A.A - State wise details of existing infrastructure

Appendix 1 A.A.G - State wise list of warehouses

Appendix 1 A.A.G.A - List of warehouses in Karnataka

Warehouses of CWC

District	Name of the warehouse	Total capacity in '000 Tonnes
Bangalore	Bangalore I	25.54
	Bangalore II	5.93
	Bangalore V	5.02
	Bangalore X	1.66
	Whitefield	5.90
	Hoskote	4.28
	Bangalore MSIL premises	
Bellary	Amarapura	22.39
Bidar	Bidar	10.00
Chitradurga	Chitradurga	27.52
Davangere	Davangere	25.93
Dharwad	Dharwad	13.33
Gadag	Gadag	48.25
Gulbarga	Gulbarga I	9.78
	Gulbarga II	35.00
	Hubli I	11.44

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Dharwad	Hubli II	9.31
Koppal	Koppal	1.48
Mandya	Maddur	4.67
	Mandya	5.19
Dakshin Kannada	Mangalore I	18.72
	Mangalore II CFS	14.70
Gadag	Nargund	10.69
Raichur	Raichur	4.68
Gulbarga	Sedam	3.60
Shimoga	Shikaripur	8.02
	Shimoga II	13.75
	Shimoga III	19.13
	Shimoga IV	68.23
	Shimoga V	17.34
Belgaum	Soundatti	9.00
Tumkur	Tumkur	23.93
Bellary	Toranagallu	121.83
	Hospet	12.22
	Bellary	15.30
Raichur	Munirabad	6.01
Chikmagalur	Chikmagalur	29.52
Hassan	Hassan	8.66
Coorg	Kushalnagar	12.06

** Details of private warehouses in Karnataka not available

Appendix 1 A.A.G.A - Region wise list of warehouses in Tamil Nadu

S.No	Name of the Region / Warehouse Address	STD Code	Phone No.	Capacity MT.
CHENNAI REGION				
01	Arakkonam Warehouse, ShahNagar, Ekku Nagar P.O., Arakkonam 631 004	04177	232547	21400
02	Arni Warehouse, 5/64, Chetput Road, Arni, Vellore Dist	04173	226821	12900
03	Kancheepuram Warehouse, 17H, Reddipet Road,Hodsenpet, Kancheepuram631 501	044	27222184	11400
04	Katpadi Warehouse, Post Box No.710, VIT Back Side, Katpadi 632 007.	0416	2915706	3400
05	Madhuranthakam Warehouse, Near Gurukulam, PuduMambakkam Madhuranthakam - 603306	044	27552454	6000
06	Polur Warehouse, Near S.I. Mills Polur, 606803	04181	222118	10000

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07	Ranipet Warehouse, 12B, SIPCOT Industrial Complex, Ponnai Road, Ranipet 632 403	04172	244758	7800
08	<u>Tiruvellore</u> Warehouse, Lakshmipuram, Tiruvellore 602 001	044	27660530	9400
09	Vellore Warehouse, TNWC, No.1, Katpadi Road, Vellore 632004	0416	2222695	9500

Coimbatore Region:

S.No	Name of the Region / Warehouse Address	STD Code	Phone No.	Capacity MT.
01	Avinashi Warehouse No. 141, Managalam Road, Avinashi 638 654	04296	273311	13800
02	Mettupalayam Warehouse Karamadai Road, Mettupalayam 641 301	04254	222076	15100
03	Palladam Warehouse Tiruppur Road, Narayanapuram Post, Palladam 638 664	04255	253005	8000

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04	Pollachi Warehouse Meenakarai Road, Pollachi 642 001	04259	226065	10380
05	Tiruppur Warehouse S.F. NO. 400, Angeripalayam Road, Tiruppur 636 603	0421	2472252	18000

Cuddalore Region:

S.No	Name of the Region / Warehouse Address	STD Code	Phone No.	Capacity MT.
01	Cuddalore Warehouse Enikkaran Thottam, Cuddalore Port 607 003	04142	238219	13000
02	Panruti Warehouse Kumbakonam Road, Panruti, Cuddalore Dist. 607 106	04142	242096	6500
03	Tindivanam Warehouse Salavathy Village, Ayyanthope P.O., Tindivanam, Cuddalore Dist.	04147	222060	9400

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04	Vridhachalam Warehouse No.9, Cuddalore Road, Vridhachalam 606 001	04143	238218	10900
05	Villupuram Warehouse Trunk Road, Villupuram 606 602	04146	222643	18800
06	Kallakurichi Warehouse Indian Oil Petrol Bunk Complex, Salem Main Road, Kallakurichi 606 202	04151	221029	3400
07	Chinna Salem Warehouse Koogaiyur Road, Chinnasalem 606 201	04151	236147	6400
08	Tiruvannamalai Warehouse 62, Anna Road, Thiruvannamalai 606 602	04175	253227	16400

Madurai Region:

S.No	Name of the Region / Warehouse Address	STD Code	Phone No.	Capacity MT.
01	Aruppukottai Warehouse 393, Sukkil Natham Road, Aruppukottai 626 117	04566	220571	8000
02	Dharapuram Warehouse S.V. Ram Warehouse, Poolavadi Road, Dharapuram 638 657	04258	234554	3104
03	Dindigul Warehouse, Palani Road, Dindigul 624 010	0451	2427319	14100
04	Karaikudi Warehouse Illupukudi Road, Alagappapuram P.O. Karaikudi 626 003	04565	220267	18500
05	Manamadurai Warehouse 17 & 18, SIPCOT Industrial Estate, Manamadurai Dist 623 606	04574	258026	6000
06	Palani Warehouse MDPCCWS Limited godown, Dindigul Road, Palani 624 191	04545	242750	2053

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07	Rajapalayam Warehouse Srivilliputtur Road, Rajapalayam 626 117	04563	222208	7400
08	Theni Warehouse Periyakulam Road, P.B. No. 5, Theni 626 531	04546	252544	12000
09	Thirumangalam Warehouse. B6, Industrial Estate, SIDCO Complex, Koothiarkundu, Pudukottai P.O., Madurai Dist 623 606	04252	2482819	12400

Salem Region:

S.No	Name of the Region / Warehouse Address	STD Code	Phone No.	Capacity MT.
01	Attur Warehouse C/o/L.P.N. Rice Mill, Attur, 636 102	04282	2641085	6800

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02	Dharmapuri Warehouse Bharathipuram Collectorate Post, Dharmapuri 636 705	04342	230987	12750
03	Gobi Warehouse 4/255B Sathy Main Road, Karattadipalayam, Gobi 638 453	04285	240619	6800
04	Krishnagiri Warehouse Ramapuram Post, Krishnagiri 635 115	04343	242443	2700
05	Namakkal Warehouse 76/A3, Triuchengode Road, Namakkal 637 001	04286	280315	9900
06	Salem Junction Warehouse Ariyangoundanpatti Lake, Suramangalam P.O. Salem 636 005	0427	2387029	28600
07	Salem Town Warehouse Seetharama Chettiar Road, Salem 636 009	0427	2352465	14200

Tirunelveli Region:

S.No	Name of the Region / Warehouse Address	STD Code	Phone No.	Capacity MT.
01	Ambasamudram Warehouse Opp. Railway Station, Ambasamudram 627 401	04634	250332	5500
02	Kovilpatti Warehouse Opp. Industrial Estate, Tuticorin Town Kovilpatti 627 701	04632	220852	9000
03	Meelavittan Warehouse Plot No. C45 to C49, Sipcot Complex Meelavittan 628 008	0461	2340366	18600
04	Palayamkottai Warehouse College Road, Perumalpuram Post, Tirunelveli 627 007	0462	2553083	18500
05	Sankaran Koil Warehouse 2/137, Kalugamalai Road, Sankarankoil 627750	04636	222478	6400

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06	Tenkasi Warehouse Madurai Road, Near Panchyat Union Office, Tenkasi 627 811	04633	280452	6400
07	Tirunelveli Warehouse Swamy Nellaiappar High Road, Tirunelveli 627 001	0462	2333723	18500
08	Tuticorin Port Warehouse Railway Quarters Trunk Road, Tuticorin 628 004	0461	2352155	44700
09	Tuticorin Town Warehouse. 59, George Road, Tuticorin.	0461	2321471	5500

Trichy Region:

S.No	Name of the Region / Warehouse Address	STD Code	Phone No.	Capacity MT.
01	Arantangi Warehouse Opp. Railway Station , Aranthangi 614 616	04371	220522	10000
02	Karur Warehouse Pasupathipalaym, Karur 639 004	04324	242288	16200

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03	Mayiladuthurai Warehouse West Sithakadu, Mayladuthurai, Thanjavur Dist.	04364	259314	17400
04	Musiri Warehouse Bye pass Road, Almarthupatti, Musiri 621 211	04326	260018	3400
05	Nagapattinam Warehouse Velipalayam, Thanjavur Dist.613 006	04365	242347	18000
06	Nanjikottai Warehouse Nanjikottai Road, Thanjavur Dist 613 006	04362	255291	19800
07	Pattukottai Warehouse No.60, Kottaikulam West Street, Pattukottai 641 601	04373	222239	4744
08	Pudukottai Warehouse Thirukogarnam P.O. Pudukootai 622 002	04322	236828	13000
09	Thiruvarur Warehouse Thanjavur Road, Vilamal, Thiruvarur 610 101	04366	222487	9000

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10	Tirchy Warehouse No.1, Tanjore Road, Trichy 620 008.	0431	2201787	15610
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Appendix 1 A.A.G - State wise list of cold storage units

Appendix 1 A.A.G.B - List of cold storage units in Karnataka

Sl. No	Distri ct	Name & Address of the cold storage	Capacity (MT)	Ownership	Commodities stored
1	Bangalore (urban)	1. Balala Tourist Hotel Pvt.Ltd(Cold Storage Division)#18/B,Veerasandra Industrial Area, Anekal Taluk	450		Fruits and vegetables
		2. M.R.C Cold Storage, 211, Bommasandra, Industrial Area, Anekal Taluk	2000		Fruits and vegetables
		3. Himalaya Cold Storage, # 52, F, Bommasandra, Industrial Area, Anekal Taluk	300		Fruits and vegetables
		4. Sumukha Cold Storage, Sampige nagar, Electronic city, (post), Anekal Taluk.	3500	Sumukha Cold Storage	Fruits and vegetables
		5. Chethan Cold Storage unit, RMC Yard, Yeshwanthpur, Bangalore North.	800	Chethan Cold Storage	Chili, Potato, Tomato, Cashew, Tamarind
		6. Kaveri Cold Storage unit, RMC Yard, Yeshwanthpur, Bangalore North.	1000	Kaveri Cold Storage	Tamarind, Cabbage, Resins, Cashew, potato
		7. Lalbagh, Cold Storage, Lalbagh, Bangalore.	800	Department of Horticulture	Functioning Potato.
2	Chikkaballapur	8. Nandi Cold Storage, BB Road	1200	Nandi Cold Storage	Potato
		9. Sapthagiri cold storage, Chikkaballapur	2500	Sapthagiri cold	Potato
		10. Bhavani cold storage, Chikkaballapur	-	Bhavani cold storage cold	

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		11	Chikkaballapur cold storage	800	Chikkaballapur, Dept. of Horticulture	Non functioning
3	Yadgiri	12	Usha Cold Storage,Industrial Area,(Roacking Area),BB Road,Shahapur	2500	Usha Cold Storage	Dry Chillies
4	Kolar	13	Kolar Cold Storage,District Office, Kolar	800	Department of Horti.	Non functioning
		14	Bhavani cold storage, Tamaka, Kolar	2500	Bhavani Cold storage	
		15	Marketing Federation cold storage, APMC, Kolar	2500	Marketing Federation	
5	Belgaum	16	Bharaphawala &Company,239/4, Mahathma Phule Road, Shahapura,Belgam	500	Bharaphawala &Company	Tamarind,BatateApple,Orange,M oosa mbi.&Flower Seeds
		17	Shakthi Agro Cold Storage,E/2,B.K.Kangrali,Industrial Estate,Belgam	3000	Shakthi Agro Cold Storage	Tamarind,BatateApple,Orange,M oosa mbi.&Flower Seeds
6	Hassan	18	Perfect Cold Storage,No.31 B,B Katehalli, Industrial Area,Hassan	3000	Perfect Cold Storage	Potato
		19	Balaji Cold Storage,Plot No.275,276,K.I.A,D,B. Industrial Area Growth Center, Holenarsipura Road,Hassan	7000	Balaji Cold Storage	Potato
		20	J.P.G.A Cold Storage Pvt .Ltd.Plot No.271,272, K.I.A.D.B. . Industrial Area Growth Center, Holenarsipura Road,Hassan	1000	J.P.G.A Cold Storage	Potato
		21	Sathanam Agro Cold Storage, Pl.No.322,	7500	Sathanam Agro Cold	Potato

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		K.I.A.D.B. . Industrial Area Growth Center, Holenarsipura Road,Hassan		Storage	
		22	Jaspindar Cold Storage Pvt. Ltd., Pl.No.322,	10000	Jaspindar Cold potato
		K.I.A.D.B. . Industrial Area Growth Center, Holenarsipura Road,Hassan		Storage	
		23	Shri Anand cold storage pvt.ltd., Pl.No.242,	8500	Shri Anand cold potato
		243, K.I.A.D.B. . Industrial Area Growth Center, Holenarsipura Road,Hassan		storage	
		2 4.	Ganpathi cold storage, No. 339, 340,	7500	Ganpathi cold storage Potato
		K.I.A.D.B. . Industrial Area Growth Center, Holenarsipura Road,Hassan		storage	
		25	Shri Gurudeva Cold storage pvt.ltd, No.1 E, Opp. HPCA, K.I.A.D.B. . Industrial Area Growth Center, Holenarsipura Road,Hassan	6800	Shri Gurudeva Cold Storage Potato
		26	Hassan cold storage	800	Department of Horticulture Non functioning
7	Tumkur	27	Gayathri cold storage, opp. Karnataka state ware house, BH Road, Tumkur.	1500	Gayathri cold Storage Tamarind, chili, potato, apple, moosambi, orange,
8	Hubli- Dharwad	2 8.	Shri. G.cold storage, 67/A, 2 nd stage, Tharihala, Industrial Area, Hubli-31	3800	Shri. G. cold storage Tamarind, chili, potato, vegetables & fruits
		2 9.	AGTK, Expo cold storage, #124, K.I.A.D.B. Industrial Area, Tharihala, Hubli-31	3800	AGTK, Expo cold storage Tamarind, chili, vegetables & fruits
		3 0.	Hubli cold storage, APMC YARD, Amaragola, Hubli	7500	Tamarind, chili, potato, vegetables & fruits
9	Bangalore (rural)	31.	Safal Market, Kannamangala,Hoskote Tq	10	Safal Potato, Fruits, Tamarind

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10	Raichur	32. Raichur cold storage pvt.ltd., Haskihalla, Raichur taluk, Raichur dist.	6500		Apple, Tamarind, chili, potato, apple, moosambi, orange, tomato, cucumber, dry chilis, dates & sum
		33 Raichur cold storage pvt.ltd., Haskihalla, Raichur taluk, Raichur dist.	6500		agricultural products.
11	Uttar kannada	34. T.S.S. Pvt. Cold storage Sirsi	886	T.S.S. Pvt. Cold Storage	Arecanut, Pepper, cardamum, vanilla,
12	Mangalore	35 .Ms/G.N.H. Kini cold storage, N.H.17, Bangra kulluru, Mangalore, 575013, D.K. district.	2100	Ms/G.N.H. Kini cold storage	Pepper, grapes, orange, peas, almond, cocam, dates.
13	Bijapur	36. Grape growers co-operative society, K.I.A.D.B Industrial Area Bijapur	1200	Grape growers co-operative society,	Dry grapes
		37. Karnataka cold storage, APMC , K.I.A.D.B Industrial Area Bijapur	1000		Dry grapes, Tamarind & fruits.
		38. Agro food cold storage, K.I.A.D.B Industrial Area, Bijapur	1000		Dry grapes
		39. Kissan cold storage, K.I.A.D.B Industrial Area Bijapur	1000	Kissan cold storage	Dry grapes, spices.
		40. Runavala agritec pvt.ltd, Toravi, Bijapur taluk, Bijapur distirict.	4000	Runavala agritec pvt.ltd	Dry grapes
		41. KAPPEC , K.I.A.D.B Industrial Area Bijapur	65	` KAPPEC	Export quality grapes
		42. Sagara Agritec cold storage, K.I.A.D.B Industrial Area, Bijapur	120	Sagara Agritec cold storage	Export quality grapes, citrus, vegetables
		43. Basaveswar agro food pvt. Ltd, K.I.A.D.B Industrial Area Bijapur	500	Basaveswar agro food	Export quality grapes
		44. K.H.B. agro foods & cold storage, APMC Yard, Bijapur.	3000	K.H.B. agro foods & cold storage	Dry grapes, Tamarind, chili, citrus, dates, apple.
		71. Sai Balaji Cold Storage, Bellary.	5500	Sai Balaji Cold storage	
		72. Lalitha Cold Storage, Ananthapura, Bellary.	3500	Lalitha Cold Storage	
		73. Prasanna Anjaneya cold storage, bellary.	5500	Prasanna Anjaneya cold	

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				storage	
		74. Ganapathi Cold Storage, Bellary.	5500	Ganapathi Cold storage	
		75. Shri Devi Cold Storage, Bellary.	3500	Shri Devi Cold storage	
		76. Thungabhadra Cold Storage, Bellary.	3000	Thungabhadra Cold Storage	
		77. Shrivari Cold Storage, Bellary.	3500	Shrivari Cold Storage	
		78. Sheshadri Cold Storage, Bellary.	2500	Sheshadri Cold Storage	
18	Bagalkote	79. Anadinni cold storage			
19	Gulbarga	80. Hussen cold storage, Heerapura ring road, gulbarga.	5000	Hussen cold storage	Vegetables, tamarind, fruits
20	Koppal	81. KAPPEC cold storage unit, kustagi taluk, koppal.	500	KAPPEC cold storage	Pomegranate tamarin, red chilli, greengram.
21	Chikkamagaluru	82. MCF cold storage, Kadur road, chikkamagaluru		MCF cold storage	Vegetables fruits

Appendix 1 A.A.G.B - List of Cold storage units in Tamil Nadu

S. NO	NAME AND ADDRESS OF COLD STORAGE	DISTRICT	CAPACITY	ITEM	SECTOR
1	Raja cold storage SF No. 173/8E, Sendurai main road, Ariyalur-621704	Perumballur	3500	multipurpose	Pvt
2	Tamil Nadu Coop marketing Fed. Ltd, Basin bridge road, Chennai-600012	Chennai	2000	multipurpose	Pvt
3	Department of racing Guindy, Chennai-32	Chennai	12	multipurpose	Pub
4	Pukharaj Mohanlal 169, Govindappa Naik st, Chennai-1	Chennai	25	dry fruits	Pvt
5	Maruthi Ice and cold storage 7, Abdul razak st, Saidapet, chennai-18	Chennai	40	fish, meat	Pvt
6	Inter sea exports corporation 64, Habibulla road, T Nagar, chennai-17	Chennai	250	Marine products	Pvt

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7	Little top exports ltd 1, Kamaraj park st Royapuram Chennai-13	Chennai	200	marine products	Pvt
8	TNFDC Ltd 67,Greams Road Chennai-6 CS at Adayar	Chennai	50	Marine products	Pub
9	Spencer & Co 788, Mount road Chennai-2	Chennai	102	multipurpose	Pvt
10	Tamil nadu coop Marketing federation Ltd., 91,St.Mary's Road,Chennai18 (CS at Koyambedu market)	Chennai	3000	Multipurpose	Coop
11	Himachal Cld stotage Ltd, Thiruvottiyur, Chennai-1	Chennai	4000	multipurpose	Pub
12	Modern Ice Manufacturers 93, Dr. natesan road, Mylapore Chennai-4	Chennai	25	Fish, Meat	Pvt
13	Sivitha ice creams p ltd, 92, P.H. road, Chennai-84	Chennai	50	ice creams	Pvt
14	Asvini fisheries ltd, 10,K.B. Dasan Road, Chennai-18	Chennai	200	marine products	Pvt
15	Madras Ice factory & CS 99, Sydenhams road, Chennai-600003	Chennai	50	Marine products	Pvt
16	Kalyani marine exports 166,peters road Royapettah,Chennai-14	Chennai	300	Marine products	Pvt
17	KPS Cold storage Ooty road, Mettupalayam-641 301 (unit-II)	Coimbatore	1500	multipurpose	Pvt
18	Nahar Cold storage Thadagam road, Coimbatore-1	Coimbatore	1500	multipurpose	Pvt
19	Tamil nadu coop milk marketing fed ltd, Coimbatore dary Coimbatore	Coimbatore	280	milk products	Coop
20	KPS Abdul Majeed & Co 10.Olylla st, Mettupalayam-641 301	Coimbatore	2500	multipurpose	Pvt
21	Kwality ice creams P ltd E-47,Kurichi Ind.Estate Coimbatore-641 021	Coimbatore	40	ice creams	Pvt
22	Abhirami cold storage P ltd Palaugarai Village Avinashi Taluk Coimbatore	Coimbatore	1000	multipurpose	Pvt
23	Suvai foods Vaikalpalayam, Perur main road, Coimbatore-541 010	Coimbatore	40	ice creams	Pvt
24	Nilgiri cold storage Ooty road Mettupalayam-641 301	Coimbatore	3000	multipurpose	Pvt
25	AKS cold storage SF No. 956-57 Bhadrakaliamman koil Tekkampally village Mettupalayam-641 305	Coimbatore	5400	multipurpose	Pvt
26	Kerala food packers Kinjampettai Cuddalore port-607 003 (closed) (closed)	Cuddalore	100	Marine products	Pvt
27	George Maijo 112, Sonagat st, Cuddalore. (closed) (closed) (closed)	Cuddalore	25	marine products	Pvt
28	ASA cold storage Ameer estate,Azad nagar Krishnagiri-635 001	Dharmapuri	5000	multipurpose	Pvt
29	Tamil nadu Coop milk marketing Fed. Ltd, Krishnagiri dairy Krishnagiri	Dharmapuri	490	milk products	Coop
30	New Vennila cold storage 117A, Jettihalli post Dharmapuri- Dt	Dharmapuri	3200	multipurpose	Pvt

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31	R.R cold storage 140/A, Kattinayarapalli, Varathanpalli Road Krishnagiri- 634 001	Dharmapuri	5000	multipurpose	Pvt
32	Brothers cold storage 65, Nalla Thambi st Krishnagiri (expansion)	Dharmapuri	1400	multipurpose	Pvt
33	Jayalakhmi cold storage Krishnagiri	Dharmapuri	750	multipurpose	Pvt
34	Vennila cold storage 25-A,Kaliappa Gounder st Mathikonpalayam Dharmapuri	Dharmapuri	2500	multipurpose	Pvt
35	Brothers cold storage 65, Nalla thambi st, Krishnagiri-635 002	Dharmapuri	2000	multipurpose	Pvt
36	Ebenazar cold storage, Odanchatram Taluk, Dindigul	Dindigul	1200	multipurpose	Pvt
37	Tamil Nadu Coop milk Marketing Fed Ltd, Dindigul dairy Dindigul	Dindigul	38	milk products	Coop
38	Avanam Pillayar cold storage P Ltd, 31-A, MVM Nagar, Dindigal- 624 004	Dindigul	2000	multipurpose	Pvt
39	Saravana cold storage 30/1 B1,Viralipatti Village Koovanoothu PO, Dindigul	Dindigul	4000	multipurpose	Pvt
40	Nilgiri dairy farm ltd, Erode	Erode	50	milk products	Pvt
41	Tamil nadu coop milk marketing fed. Ltd Erode dairy Erode	Erode	602	milk products	Coop
42	Thirumuruga cold storage Ltd, SIPCOT Ind. Estate, Perumdurai Erode (dt)	Erode	5200	multipurpose	Pvt
43	George maijo & Co, Plot.No.23, MGR road, Palavakkam, Chennai- 41(closed)	Kancheepuram	250	Marine products	Pvt
44	Westernfarm fresh P ltd 15/1-B1 Varadarajapuram Poonamallee Sriperumbudur	Kancheepuram	2500	fruits and vegetables	Pvt
45	Abad Overseas P ltd, C/2, SIPCOT Ind. Estate, Irrungattukottai Chennai-602 105	Kancheepuram	500	Marine products	Pvt
46	Aries exports P Ltd Kumaran nagar, Old Mahabalipuram road Chamacheri, Chennai-96	Kancheepuram	100	marine products	Pvt
47	Devi marine exports ltd, 63/1, Muttukadu road, Chennai-41	Kancheepuram	150	Marine products	Pvt
48	New India Maritime Agencies 55, Armenian st Chennai-1 CS at Tondiarpet	Kancheepuram	750	Multipurpose	Pvt
49	Agri-Marine exports P ltd Ennore coastal high road Chennai-19	Kancheepuram	75	Marine products	Pvt

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50	Liberty cold storage Ltd, 63/1, Muttukadu road, Neelankarai, Chennai-41	Kancheepuram	750	Marine products	Pvt
51	New India maritime agencies 55, Armenian St, Chennai-1 CS at Tondiarpet	Kancheepuram	400	Marine products	Pvt
52	TNFDC Ltd 67, Greams Road, Chennai-6 Cs at Ennore CS at Adayar	Kancheepuram	100	Marine products	Pub
53	Agar & Alginate Laboratories Muttukadu road, Neelankarai, Chennai-41(closed)	Kancheepuram	75	Marine products	Pvt
54	Farm SuzzanneP ltd Palavakkam Chennai-41	Kancheepuram	200	Marine products	Pvt
55	Blue star foods 4-215A, MGR road Palavakkam Chennai-41	Kancheepuram	150	Marine products	Pvt
56	Victoria Marine & Agro exports ltd, 37, Old Mahabalipuram road,Padur, Chennai	Kancheepuram	350	marine products	Pvt
57	Overseas marine products D-3.block, DII, Alwarpet Chennai-18 CS at kancheepuram Dt	Kancheepuram	400	Marine products	Pvt
58	Cochin sea foods, 4/216 , MGR road, Palavakkam,Chennai-41	Kancheepuram	150	Marine products	Pvt
59	Orient marine products P Ltd Manjambakkam, Chennai-600 060	Kancheepuram	300	marine products	Pvt
60	Ayshwarya Seafoods Ltd 4/364, Anna Rd,Palavakkam Chennai-41	Kancheepuram	150	marine products	Pvt
61	RBT exports 291,Bandikavannor village Ponneri Taluk	Kancheepuram	180	marine products	Pvt
62	Balaji sea food exports Ltd 107,Bandikavannor village Sholavaram post Chennai-67	Kancheepuram	140	marine products	Pvt
63	Sri sakthi cold storage P ltd 35, Kazhipattur village Padur post Kancheepuram Dist	Kancheepuram	400	marine products	Pvt
64	Ocean foods I ltd Padur village Old Mahabalipuram road Chennai-103	Kancheepuram	100	marine products	Pvt
65	Westernfarm fresh P Ltd Varadarajapuram Poonamalee Sriperambadur,Chennai	Kancheepuram	5475	multipurpose	Pvt
66	Asian marine products p Ltd East coast road, Injambakkam, Chennai-41	Kancheepuram	150	marine products	Pvt
67	Oceanic Fisheries Ltd Padanthalmoodu Kanyakumari Distt	Kanyakumari	50	Marine Products	Pvt
68	Relish foods P Ltd, 17/9B, Tirunelveli Road, Madhavapuram, Kanyakumari	Kanyakumari	75	Marine products	Pvt

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69	M.M.Hitech cold storage P ltd, 104, East masi st Madurai-625001 (expansion)	Madurai	2000	multipurpose	Pvt
70	Ayyanar cold storage Madurai-Dindigul NH Ayyankottai Madurai-624221 (expansion)	Madurai	206	multipurpose	Pvt
71	Ayyanar cold storage , Dindigul NH road, Ayyankottai, Madurai-624221.(expn)	Madurai	3200	multipurpose	Pvt
72	Kaveri cold storage Paravai village Madurai-625 402 (expansion)	Madurai	2000	multipurpose	Pvt
73	Farmer brothers & co 33, M.C. Chidambara nadar st, Virudhnagar CS at Madurai	Madurai	3500	multipurpose	Pvt
74	M.M.Hi-Tech cold storage P ltd, 104, East Masi st, Madurai-625 001	Madurai	2000	multipurpose	Pvt
75	Tamil nadu coop milk marketing fed. Ltd, Madurai dairy Madurai	Madurai	735	milk products	Coop
76	Kaveri cold storage 39C/NH, Paravai Village, Madurai-625 019	Madurai	3500	Multipurpose	Pvt
77	Ayyanar Cold storage Madurai-Dindigul NH Ayyankottai, Madurai-624221	Madurai	4000	Multipurpose	Pvt
78	ADR cold storage, D-24, SIDCO Ind. Estate, Kappalur, Madurai.	Madurai	2327	multipurpose	Pvt
79	Tamil Nadu coop milk marketing fed ltd Ooty dary Ooty	Nilgiris	470	milk products	Coop
80	Shanmuganathan cold storage P ltd, 95-A, Thiru-Vika nagar, Puthur, Trichy-620 017 (CS at Puthukottai)	Puthukottai	2500	multipurpose	Pvt
81	TNFDC Ltd Boat building yard Mandapam 623 518	Ramnathapuram	100	Marine products	Pvt
82	Poyilakada fisheries Ltd RS No.38/1235, Nagachi Village, Uchuppudi Ramnad Dist	Ramnathapuram	200	Marine products	Pvt
83	Baby marine exports Mandapam Ramnadapuram Dt	Ramnathapuram	400	Marine products	Pvt
84	Asvini fisheries Ltd, 10, K. B dasan Road, Chennai-6000 18 (CS at ramanathapuram)	Ramnathapuram	300	marine products	Pvt
85	Tamil nadu coop milk marketing fed ltd, Ramanathapuram dairy Ramnad	Ramnathapuram	40	milk products	Coop
86	Tamil nadu coop milk Marketing Fed Ltd Salem dairy Salem	Salem	543	milk products	Coop

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87	Raj Vignesh cold storage P ltd, 107/5B,Kudalore village Sankan Taluk Salem	Salem	2500	multipurpose	Pvt
88	Sri Selvi cold storage P Ltd, 81/6-C, kanagagiri village, Kakapalayam, Salem-637 103	Salem	2500	multipurpose	Pvt
89	Atlantic foods Ramalingapuram Salem-636 106	Salem	100	Ice creams	Pvt
90	Sri Sachithananda Cold storage,90, east masi St, Madurai-625 001 CS at Theni	Theni	3000	multipurpose	Pvt
91	Sri Sundaram Cold storage Allingaram,Periyakulam Rd, Theni	Theni	4000	multipurpose	Pvt
92	National dairy devt. Board Ambattur dairy Ambattur	Thiruvallur	175	milk products	Coop
93	Parwaz food packers 289/2B,Thiruvallur road Alamatti, redhills Chennai-52	Thiruvallur	200	marine products	Pvt
94	Saradakripa cold storage P ltd, plot. No.34, Madhavaram Village Ambattur Taluk	Thiruvallur	5400	multipurpose	Pvt
95	Renuka Parameswari cold storage P ltd, S.No. 766/1 Near Madhavaram Fly over Madhavaram	Thiruvallur	6050	multipurpose	Pvt
96	Poorna Vijayasali cold storage ltd, 14, Lotus colony Ist street, Madavaram Chennai-600060	Thiruvallur	3100	multipurpose	Pvt
97	SBP cold storage P ltd P H Road, Noombai village, Behind sindhi college Chennai-600077	Thiruvallur	2000	multipurpose	Pvt
98	Tamil nadu coop milk marketing fed. Ltd, Ambattur dairy II Ambattur	Thiruvallur	384	milk products	Coop
99	Govind cold storageP ltd Ambattur Taluk Thiruvallur	Thiruvallur	4150	multipurpose	Pvt
100	Tamil nadu coop milk marketing fed ltd, Ambattur dairy Ambattur	Thiruvallur	575	milk products	Coop
101	Hatsun foods Company Nallur Village,Ponneri, Thiruvallur Dt	Thiruvallur	200	ice creams	Pvt
102	Bala marine exports P ltd 1/145,APH road,Vanagaram Chennai-102	Thiruvallur	55	marine products	Pvt
103	Somanica foods P ltd 372, Ind.Estate Ambattur, Chennai-58	Thiruvallur	45	ice creams	Pvt
104	Tamil nadu coop milk marketing fed ltd, Tirunelveli dairy Tirunelveli	Tirunelveli	130	milk products	Coop
105	Trichy cold storage P ltd, SIDCO Ind.Estate, Thuvakudi, Trichy.	Trichy	5000	multipurpose	Pvt
106	Nila sea foods 166-A, North beach road, Tuticorin- 628 001	Tuticorin	50	marine products	Pvt
107	George Maijo & Co, 2-B, Apex Plaza 3, Nungambakkam High Road, Chennai-34 CS at Mandapam	Tuticorin	75	Marine products	Pvt

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108	Amulya sea foods C-84, SIPCOT Ind. Estate Tuticorin-628 008	Tuticorin	200	Marine products	Pvt
109	Amulya sea foods P ltd, C-97 SIPCOT Ind. Estate Tuticorin-628008	Tuticorin	200	Marine products	Pvt
110	Diamond seafood exports 3/52,Krishnarajapuram Tuticorin-628002	Tuticorin	150	Marine products	Pvt
111	TNFDC Ltd 166A, North beach road, Tuticorin-628001	Tuticorin	150	Marine products	Pvt
112	Kings international Aqua exports ltd, 51/15B, Muniaswamipuram II st,Kamaraj Salai, Tuticorin-628 101	Tuticorin	100	marine products	Pvt
113	Baby marine eastern exports C-75 SIPCOT Ind.Estate Tuticorin-628 008	Tuticorin	400	Marine products	Pvt
114	Theva & Co 3/52, Krishnarajapuram Tuticorin-2	Tuticorin	200	Marine products	Pvt
115	Nila seas foods P ltd, 137-A, Pudurpandiapuram Tuticorin-628 002	Tuticorin	500	marine products	Pvt
116	Amulya sea foods C-96 SIPCOT Ind.Estate Tuticorin-628 008	Tuticorin	100	marine products	Pvt
117	Ninans cold storage SIPCOT ind.complex Madathur Tuticorin	Tuticorin	5150	Fruits & Vegetable	Pvt
118	Nila cold storage P Ltd 215-B, Pudurpandiapuram Tuticorin	Tuticorin	10000	multipurpose	Pvt
119	Kadar Investment & trading Co Ltd, C-51 SIPCOT Ind.Estate, Tuticorin-8	Tuticorin	500	Marine products	Pvt
120	Indus cold storage 1/129, Chitheri, Vellore	Vellore	1000	multipurpose	Pvt
121	Sri Krishna cold storage 10/2-5, Paranattamangalam Salem	Salem	5300	multipurpose	Pvt
122	Adi Sakthi cold storage p Ltd, Annur road, Bellady village, Mettupalayam.	Coimbatore	5000	multipurpose	Pvt
123	kolar Cold storage Alamaram stop Jedayampalayam village Mettupalayam	Coimbatore	4500	multipurpose	Pvt
124	Palamudir cold storgae Chinnayampalayam Coimbatore	Coimbatore	500	multipurpose	Pvt
125	Ranga Lalitha Cold Storage, 500, Main Road, Shevepet, salem-636 002	Salem	2000	multipurpose	Pvt
126	Vidya Bharathi cold storage, 152/34, G N T Road, Madhavaram, Chennai	Thiruvallur	5500	mutipurpose	Pvt
127	Garden Fresh cold storage, SF 89, Karisalpatti, Allampatti PO, Thirumangalam	Madurai	2500	multipurpose	Pvt
128	Sri Ayyappa Hitech cold storage Ltd, 277/2, Jadayampalayam, Annur road, Mettupalayam, Coimbatore	Coimbatore	5000	multipurpose	Pvt

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

129	Ranga Lalitha cold storage, 500, main road, Shevapet, salem-636 002	Salem	2000	multipurpose	Pvt
130	EmpeeBee Exports&imports, 109/3, Noombal Village, Ambattoor	Thiruvallur	3000	multipurpose	Pvt
131	Fazil cold storage, SF 68, Punganur village, Dindigul road, Trichy.	Trichy	4400	multipurpose	Pvt
132	Elumalai Cold Storage P Ltd, 31/1A, Padikaspatti village, Rajapalayam, Virudhnagar,	Virudhnagar	2320	multipurpose	Pvt
133	Sree Bishnu Potato cold storageLtd,SF 464/3,Bellathi village, Mettupalayam	Coimbatore	7000	multipurpose	Pvt
134	Devraj Agro Industries 103, women ind. Park, Thirumullaivoyal, Ambattor	Thiruvallur	5760	multipurpose	Pvt
135	Kolar cold storage 238/1, Jadampalayam village Mettupalayam.	Coimbatore	4250	multipurpose	Pvt
136	Arunachala cold storage 219/1A-4, Puzhal Vill, Vadaperumbakkam, Ambattur.	Thiruvallur	5300	multipurpose	Pvt

Appendix 1 A.A.G - State wise list of ICDs & CFSs

Appendix 1 A.A.G.C - List of ICD & CFS in Karnataka

Location	Whether CFS or ICD	Agency/ Company	State	Date of LOI	Whether Functioning or Under Implementation
Mangalore (Panambur)	CFS	Central Warehousing Corporation	Karnataka	14/08/1995	F
Karwar	CFS	Central Warehousing Corporation	Karnataka	24/03/2000	F
Whitefield, Bangalore	CFS	Central Warehousing Corporation	Karnataka	09/05/2000	F
Bangalore	CFS	M/s Continental Warehousing Corporation Ltd.	Karnataka	02/08/2001	UI

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Kanwar Port	CFS	M/s Vikram Integrated Logistics Pvt. Ltd .	Karnataka	13/05/2005	F
Hassan	CFS	Vikram Logistics and Maritime Services (P) Ltd	Karnataka	16/04/2008	F
Bangalore	CFS	Hindustan Aeronautics Ltd	Karnataka	21/04/2008	UI
Jokkate Road, Baikampadi, Mangalaore	CFS	ABG Infralogistics Limited, Mumbai	Karnataka	25/11/2010	UI
Whitefield, Bangalore	CFS	Marigold Logistics Private limited	Karnataka	02/02/2012	UI
Kachrakanahalli village, Bangalore	ICD	Sical mullimodal and Rail transport Ltd.	Karnataka	12/11/2012	UI
Atlibe, Anekal Taluk, Bangalore	ICD	M/s Palrecha Infrastructure and Developers	Karnataka	20/03/2013	UI

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Appendix 1 A.A.G.C - List of ICD & CFS in Tamil Nadu

Location	Whether ICD or CFS	Agency/ Company	State	Date of LOI	Whether Functioning or Under Implementation
Tuticorin	CFS	Container Corporation of India Ltd.	TN	22.10.92	F
Tuticorin	CFS	M/s SEC Services Ltd.	TN	16.10.92	F
Madhavaram	CFS	Central Warehousing Corporation	TN	13.08.93	F
Tirupur	CFS	M/s TEA Lemuir Cont, Terminal Pvt. Ltd.	TN	28.03.94	F
Tuticorin	CFS	M/s St. John Freight Systems Pvt. Ltd.	TN	11.08.94	F
Coimbatore, Singanallur	CFS	Central Warehousing Corporation	TN	14.08.95	F
Chennai	CFS	M/s Gateway Distriparks (South) Pvt. Ltd.	TN	28.02.95	F
Chennai	CFS	Ws A.S.Shipping Agencies Pvt. Ltd.	TN	28.02.95	F
Salem	CFS	Ws Sanco Trans Ltd.	TN	14.08.95	F
Chennai	CFS	Balmer Lawrie & Co. Ltd.	TN	24.10.95	F
Chennai	CFS	M/s Viking Warehousing	TN	24.10.95	F
Chennai	CFS	M/s SICAL Distriparks Ltd.	TN	15.07.96	F

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Tuticorin	CFS	Central Warehousing Corporation	TN	10.11.97	F
Tuticorin	CFS	Ws Sanco Trans Ltd.	TN	10.11.97	F
Madurai	ICD	Container Corporation of India Ltd.	TN	10.11.97	Non Functional
Chennai	CFS	M/s Sattva Hi-Tech & Conware Pvt. .Ltd.	TN	01.09.99	F
Malpakkam Arakkonam	ICD	M/s Sattva Hi-Tech & Conware (Arakkonam) Pvt.. Ltd.	TN	24.03.2000	F
Tuticorin	CFS	M/s Continental Container Freight Station This CFS has been amalgamated with Indev Logistics Private Ltd. With the approval of IMC held on 21.10.10.	TN	24.03.2000	F
Karur	CFS	M/s Continental Container Freight Station Pvt. Ltd.(Continental Container Freight Station was changed to Continental Container Freight Stations Pvt.Ltd. vide their letter dated 20.6.10.This CFS has been amalgamated with Indev Logistics Private Ltd. With the approval of IMC held on 21.10.10.	TN	28.06.2000	F
Tuticorin	CFS	M/s Raja Agencies	TN	07.06.01	F
Madhavaram	CFS	M/s Continental Warehousing Corporation Ltd. , Chennai (LOI was transferred to Continental Warehousing Corporation (Nhava Seva) Ltd. , Navi Mumbai on 7/6/2010	TN	09.08.2000	F
Manali	CFS	M/s Indian Corporate Business Centre Ltd.	TN	02.08.02	F

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Tirupur	CFS	M/s Continental Container Freight Station Pvt. Ltd,(Continental Container Freight Station is converted into Continental Container Freight Stations Pvt. Ltd. vide their letter dated 20.6.10. This CFS has been amalgamated with Indev Logistics Private Ltd. With the approval of IMC held on 21.10.10)	TN	06.08.02	F
Tuticorin	CFS	M/s K.S.P.S. Natarajan CFS Park Pvt. Ltd.	TN	07.08.02	F
Tuticorin	CFS	M/s Hari & Co	TN	16.08.02	F
Manali	CFS	M/s Kailash Shipping Services Pvt. Ltd.	TN	08.11.02	F
Edyansavadu (Ponneri Taluk)	CFS	M/s Triway CFS Pvt. Ltd.	TN	22.11.02	F
Tirupur	ICD	Container Corporation of India Ltd.	TN	07.05.03	F
Chennai	CFS	M/s Vishrutha Logistics Ltd.	TN	30.06.03	F
Coimbatore	ICD	M/s Chettinad Logistics Pvt. Ltd.	TN	26.09.03	
Irugur	ICD	Container Corporation of India Ltd.	TN	24.11.04	F
Tuticorin	CFS	M/s A S Shipping Pvt. Ltd.	TN	17.05.05	F
Manali	CFS	M/s Sattva Logistics Pvt. Ltd.	TN	26.09.05	UI
Chennai	CFS	M/s Allcargo Movers (I) Pvt. Ltd.	TN	06.03.06	F

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Vallur Village Chennai	CFS	M/s German Express Shipping Agency (India) Pvt. Ltd.	TN	06.03.06	F
Napalayam, Chennai	CFS	M/s PRK Container Freight Station Pvt. .Ltd.	TN	11.05.06	UI
Irrungattukottai, Sriperumbudur	CFS	Glovis India Pvt.Ltd., Tamil Nadu (LOI issued to Hyundai Motor India Ltd. was cancelled on 1.1.10 and LOI was reissued to Glovis India (P) Ltd.on 1.1.10	TN	1.1.2010	F
Vichur Village, Chennai	CFS	M/s. Avanthi Logistics Pvt, Ltd.	TN	29.06.06	UI
Sadayankuppam Village Chennai	CFS	M/s GRR Logistics Pvt. Ltd.	TN	26.07.06	UI
Chennai	CFS	M/s Chandra CFS and Terminal Operators Pvt. Ltd.	TN	26.07.06	F
Kattram bakkam Village, Chennai	ICD	M/s Sun Global Logistics Pvt.Ltd.	TN	26.07.06	F
Irungattukottai Chennai	ICD	M/s Indev Logistics Pvt Ltd.	TN	26.07.06	F
Chennai	CFS	Mis Devadoss Reddy Logistics Pvt. Ltd.	TN	12.10.06	F
Tuticorin	CFS	M/s Vilsons Container Terminal	TN	15.05.07	F
Tuticorin	CFS	Central Warehousing Corporation	TN	15.05.07	F
Gummidipoondi Chennai	CFS	M/s Durai Shipping & Services Pvt. Ltd.,	TN	15 05 07	UI

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Chrompet (Chennai)	ICD	Central Warehousing Corporation	TN	02.08.07	F
Chennai	CFS	M/s Ennore Cargo Containers Terminals Pvt. Ltd.	TN	10.02.05	F
Chennai	CFS	M/s Seahorse Distribution and freight Services Pvt.Ltd	TN	03.03.08	UI
Gounderpalayam	CFS	M/s Maersk India Pvt.Ltd.	TN	04.03.08	
Vichur village	CFS	M/s R.R.Distriparks (P) Ltd	TN	08.04.08	UI
Tuticorin	CFS	M/s Diamond Shipping Agencies Pvt.Ltd., Tuticorin	TN	4.6.2008	F
Chennai	CFS	M/s Triway Warehouses and Holdings Pvt. Ltd. Chennai	TN	6.6.2008	UI
Tuticorin	CFS	M/s St. John Freight Systems Ltd. , Tuticorin	TN	1.9.2008	UI
Milavattan Village, Tuticorin	CFS	SICAL Distriparks Ltd	TN	27.4.2009	F
Puzhal Village, Thiruvallur, Chennai	CFS	Calyx Container Terminal Pvt.Ltd Mumbai	TN	19.8.09	UI
Ponneri Taluk, Tiruvallur Distt. Near Ennore Port	CFS	Sattva Conware Pvt.Ltd. , Chennai	TN	1.1.2010	F
Madhavaram, Chennai	CFS	iThiru Rani Logistic Private Ltd.Chennai	TN	11.2.2010	

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Kattupalli Port,Ponneri Taluka,Thiruvallur Dist. T.N	CFS	L&T Shipbuilding Ltd.Chennai	TN	2 6.2010	UI
Attathangal/Nallur Village	CFS	Continental Warehousing Corporation (Nhava Seva), Navi Mumbai	TN	18.10.10	UI
Ambur,North Arcot District	CFS	Western Gateway Cargo Services Private Limited	TN	02.02.12	UI
Hosur, Krishnagiri District	ICD	Pearl Port & Warehousing Pvt. Ltd.	TN	31.05.12	UI
Door No.121, Harbour Express Road,Tuticorin	CFS	Chola Logistiks Pvt.Ltd	TN	20.6.12	F
Manali, Vaikadu Village, Chennai	CFS	Sudharsan Logistics Pvt.Ltd.	TN	12.11.12	UI
Anuppampattu Village	CFS	Sical Multimodal and Rail Transport Ltd.	TN	07.12.12	UI
Tiruvottiyur, Chennai	CFS	STP, Services Private Limited	TN	05.09.13	UI
Chennai Port	CFS	Chennai Port Trust	TN	17.12.13	UI

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Appendix 1 B - Exit Point Infrastructure

Appendix 1 B.B.A - Commodity Wise Port Wise Provisional Capacities Of Major Ports (as on 31.12.2014)

(IN MILLION TONNES)

Sl. #	COMMODITY	K OL KA TA	HAL DIA	PARADIP	VIZ AG	CHEN NAI	ENN ORE	VO C	COC HIN	NEW MA- NGALORE	MORM UGAO	MUM BAI	KANDL A	J.N. P	TOTAL
1	P.O.L	4.5 0	17.00	43.00(1)+ 3 SBM	17.6 5	17.65	3.00	2.3 0	24.01	49.17	1.50	32.00	66.60+0 .8	5.50	291.90+ 4.80
		+4 .0	(3+2 BJ)		(4)	(4)	(1)	(1)	(4)+S PM	(5+ SPM)	(1)	(5)	(8+3SB M)+A	(2)	(44+8S BM+ 2BJ)
		(7) +A													
2	IRON ORE		6.00	4.50	12.5 0	12.50	6.00			7.50	27.50				72.00
			(2)	(1)	(1)	(1)	(1)			(1)	(1+3 Trans)				(8+ 3Trans)
3	COAL		7.00	20.00			21.00	12. 55		5.40 (1)					65.95
	(THERMAL)		(2)	(2)			(3)	(3)							(11)

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Capacity Addition during April 2014 to September 2014	0.00	0.00	10.00	0.00	0.00	2.00	0.00	0.00	0.00	7.11	0.00	4.00	0.00	23.11
TOTAL (Upto 30-09-2014)	17.14	49.75	118.80	88.92	86.04	33.00	42.06	49.66	77.77	43.76	44.53	106.32	65.88	823.63
	+4	(17)+2BJ	(15)+3SPM	(22)	(24)	(6)	(15)	(19)+SPM	(15 +SPM)	(6+3Trans)	+6.0	+0.8	(12)	11.31
	.51													
	(33)+A										(31)+A	(24+3SBM)+A		(239+9SBM)+A
														3 Trans+2BJ+A)

Figures in the parenthesis indicate the number of berths. BJ - Barge Jetties, T - Transhippers, A - Anchorages, SBM - Single Buoy Mooring

@ Capacity of JNP container terminal (3 berths), NSICT (2 berths), GTIL (3 berths) and shallow water berth (1 no) has been taken as 16.88 MT, 15.00 MT, 26.40 MT and 1.20 MT respectively. Capacity of one shallow water berth at JNPT is 0.90 MT for dry bulk cargo.

At Mumbai, only BPS berth is considered as dedicated container berth. Assessed capacity of BPS(Dedicated) container berth is 1.0 MT

Berth No 6, 7/8 ID are used as holding berths for MBPT Crafts and no capacity has been accounted.

** Capacity of Chennai Port 1st Container Terminal (4 Berths) and IInd Container Terminal (3 Berths) has been taken as 24.00 MT and 18.00 MT respectively

Capacity of Iron Ore Berth has been taken as 6.0 MT at Ennore Port. After full fledged commissioning, balance capacity of 6.0 MT will be added

* After accounting the capacity due to productivity, addition of berth No 13 & 15, MHC, Floating cranes

Only BPS berth of Mumbai Port is considered as dedicated container berth. Assessed capacity of BPS(Dedicated) container berth of Mumbai Port is 1.0 MT. Berth No 6,7/8 ID are used as holding berths for MbPT crafts and no capacity has been accounted.

Provisional Total Capacities of all the ports in India as on 31.12.2014 :1423.100 Mn Tons

Source: Port Authority of India

Appendix 1 B.B.A - Details of export of agri commodities from Major seaports

	2011-12		2012-13		2013-14	
	Qty	Value	Qty	Value	Qty	Value
Port: MUMBAI SEA						
Alcoholic Beverages	4690	2003.62	0	0	11154.75	5613.54
Miscellaneous Preparations	1.48	4.49	0	0	7.33	17.44
Jaggery & Confectionery	550	157.71	0	0	3.5	6.61
Fresh Onions	3891	313.12	575.34	55.12	0	0
Milled Products	10029	1634.34	5378.86	874.5	0	0
Non Basmati Rice	57822.94	12190.6	12055	2540.17	0	0
Other Cereals	0	0	9000	1403.6	0	0
Poultry Products	0	0	80	17.73	0	0
Total	76,984.42	16,303.88	27,089.20	4,891.12	11,165.58	5,637.59

Source: DGCIS Annual Export

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Product	2011-12		2012-13		2013-14	
	Qty	Value	Qty	Value	Qty	Value
Buffalo Meat	633458.89	867987.46	618734.1	932126.46	687270.25	1318989.23
Fresh Onions	776246.34	92993.63	959880.62	112381.19	790332.69	155337.08
Fresh Grapes	61893.85	45267.96	126929.6	111132.88	151160.95	151012.47
Pulses	141887.08	86939.85	176260.46	111935.57	284379.09	141747.6
Alcoholic Beverages	129338.03	83128.88	134640.02	90916.91	148044.35	113579.68
Non Basmati Rice	163919.06	36917.78	294670.11	73631.32	381520.02	107005.42
Maize	653408.95	89734.07	760334.2	120387.49	663048.27	99616.76
Other Processed Fruits & Vegetables	102742.46	62318.31	113311.05	75523.93	107874.3	87222.31
Dairy Products	4046.52	7452.25	19066.54	32286.48	33050.61	71481.63
Cereal Preparations	80388.91	48204.49	84561.82	59457.04	83616.96	66544.48
Miscellaneous Preparations	72898.76	36403.07	91762.03	44496.87	102890.15	55444.25
Cocoa Products	12005.25	11378.37	15183.84	22184.4	9525.68	42698.14
Jaggery & Confectionery	60472.94	28601.32	61157.42	30728.35	70608.62	41188.51
Other Fresh Vegetables	175928.42	33362.15	165836.5	36675.13	160432.95	40442.07
Other Fresh Fruits	80033.16	22224.41	80669.28	32695.59	63303.44	37333.41
Milled Products	66269.69	15747.05	80716.95	19561.19	121438.72	32514.25

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Groundnuts	56571.91	34961.98	42543.32	30702.1	49138.73	31549.61
Fresh Mangoes	22840.25	11070.79	37533.29	16231.94	27732.6	17522.8
Other Cereals	36896.3	6392.5	82011.57	14630.3	84492.1	16429.33
Mango Pulp	25621.46	15793.34	17389	12291.52	24067.71	14908.19
Guargum	5977.97	10988.41	6140.09	22963.59	5483.05	12601.12
Sheep/Goat Meat	5053.39	10988.44	4201.25	9559.82	5776	12391.56
Dried & Preserved Vegetables	9122.45	8920.07	11299	10142.65	9380.71	11492.45
Poultry Products	39475.2	5855.63	14430.44	6538.08	6414.36	6831.41
Cucumber and Gherkins(Prepd. & Presvd)	16472.66	4927.33	16893.47	6040.93	16223.06	6545.51
Wheat	31038.36	4206.13	33808.21	5828.57	35788.68	6497.47
Fruits & Vegetables Seeds	3063.84	2954.52	2751.59	3279.3	3547.66	4595.66
Basmati Rice	34723.37	14775.3	8025.43	4376.38	5641.85	4391.24
Walnuts	1432.67	5610.64	1097.9	4329.81	868.81	4367.38
Casein	65.74	282.33	629.78	2563.88	355.27	2093.85
Animal Casings	347.12	642.69	362.58	533.17	156.12	1262.72
Floriculture	705.36	885.58	1053.91	1256.19	738.26	1012.19
Processed Meat	537.96	847.97	777.2	895.02	485.22	680.02
Natural Honey	69.41	130.18	183.92	239.47	136.88	232.04
Albumin(Eggs & Milk)	0.08	0.14	1.21	0.89	0.41	0.66
Other Meat	150.45	167.02	113.03	119	0	0
Total	35,05,104.26	17,09,062.04	40,64,960.73	20,58,643.41	41,34,924.53	27,17,562.50

Source: DGCIS Annual Export

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Port: MARMAGOA SEA						
Product	2011-12		2012-13		2013-14	
	Qty	Value	Qty	Value	Qty	Value
Wheat	0	0	31190	5422.13	43999.8	7235.28
Alcoholic Beverages	317.63	427.62	1397.71	2408.12	2521.2	5274.47
Jaggery & Confectionery	0	0	0	0	5472	1540.94
Miscellaneous Preparations	0	0	0	0	2926	752.44
Other Processed Fruits & Vegetables	1.32	2.51	1.32	2.78	2.4	10.99
Maize	960	144.49	27980	4148.93	0	0
Total	1,278.95	574.62	60,569.03	11,981.96	54,921.40	14,814.12

Source: DGCIS Annual Export

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

							Value in Rs Lacs
							Qty in MT
Port: NEWMANGALORE SEA							
Product	2011-12		2012-13		2013-14		
	Qty	Value	Qty	Value	Qty	Value	
Maize	83261	10719.7	160091	24161.77	84253	11908.49	
Wheat	0	0	27000	4595.62	33000	5416.52	
Jaggery & Confectionery	8.3	3.52	608.31	169.08	9393.15	2579.39	
Cocoa Products	680.43	774.36	645.94	893.7	1197.75	1644.01	
Cereal Preparations	219.61	266.21	225.21	334.86	1091.96	1230.48	
Miscellaneous Preparations	5	2.62	0	0	3113.17	1077.52	
Floriculture	1318.71	729.93	881.44	641.52	88	172.88	
Other Processed Fruits & Vegetables	10.1	16.41	60.26	19.56	87.87	169.64	
Non Basmati Rice	120.28	28.79	382.66	103.37	267.37	84.68	
Cucumber and Gherkins(Prepd. & Presvd)	285.66	81.47	266.84	85.32	40.8	16.68	
Alcoholic Beverages	23.01	23.05	127.69	54.05	20.81	7.22	
Dairy Products	0	0	0	0	0.53	2.34	
Other Fresh Fruits	63.1	88.19	0	0	0.18	0.38	
Natural Honey	0	0	0	0	0.13	0.37	
Mango Pulp	0	0	0	0	0.72	0.36	
Milled Products	15	3.26	0	0	0	0	

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Total	86,010.20	12,737.51	1,90,289.35	31,058.85	1,32,555.44	24,310.96
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Source: DGCIS Annual Export

Value in Rs Lacs						
Qty in MT						
Port: COCHIN SEA						
	2011-12		2012-13		2013-14	
Product	Qty	Value	Qty	Value	Qty	Value
Miscellaneous Preparations	7018.07	5444.49	10248.98	8231.32	14127.59	16034.2
Non Basmati Rice	60231.64	11552.98	40438.75	11889.89	42982.89	16027.25
Other Processed Fruits & Vegetables	22550.74	13029.26	13147.06	12381.94	10463.34	14588.1
Cereal Preparations	9577.23	4602.2	11800.75	8458.29	13807.89	10008.21
Dairy Products	238.89	421.91	4602.1	7791.04	3538.51	8843.26
Buffalo Meat	2.67	77.84	2112.08	3071.3	2466	4087.05
Milled Products	15048.94	4046.54	12803.11	3827.73	7310.03	3390.12
Dried & Preserved Vegetables	1637.34	1860.91	1656.29	2348.93	1147.57	2387.61
Other Fresh Vegetables	3381.25	996.11	2809.88	1012.68	3049.42	1686.35

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

APEDA

Fruits & Vegetables Seeds	214.66	2301.14	110.55	871.19	170.3	1039.91
Jaggery & Confectionery	3241.3	648.02	3216.81	884.12	1541.78	918.03
Poultry Products	2871.31	1274.44	3191.5	750.12	2596.32	611.12
Other Fresh Fruits	2371.07	844.4	2221.1	920.45	624.33	339.6
Cocoa Products	587.32	1042.32	196.6	307.37	40.52	181.85
Alcoholic Beverages	0.97	28.28	32.23	173.04	33.26	128.33
Floriculture	23.45	11.85	42.53	85.31	84.08	127.3
Mango Pulp	3745.24	1555.39	3078.58	1034.51	224.4	102.46
Other Cereals	736.02	131.46	365.11	80.3	218.84	92.87
Fresh Mangoes	124.53	112.45	112.91	134.95	31.94	45.45
Basmati Rice	69.7	24.31	44.15	20.97	30.9	24.08
Pulses	32.02	14.81	11.4	6.22	11.7	13.69
Groundnuts	276.38	109.81	20.64	19.33	18.2	12.36
Fresh Grapes	6.61	16.55	130.09	136.18	11.45	7.19
Wheat	41.56	9.99	47.6	11.42	32.38	6.66
Processed Meat	0.1	0.3	4.44	11.41	0.84	2.33
Casein	0.4	0.95	0.05	0.06	0.2	0.52

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Natural Honey	24.09	33.55	0.08	0.12	0.17	0.21
Maize	0	0	5.72	1.63	0.96	0.14
Fresh Onions	86.76	22.39	50.92	12.89	0	0
Guargum	9.9	22.17	0	0	0	0
Sheep/Goat Meat	0	0	1.68	3.94	0	0
Total	1,34,150.16	50,236.82	1,12,503.69	64,478.65	1,04,565.81	80,706.25

Source: DGCIS Annual Export

Value in Rs Lacs						
Qty in MT						
Port: TUTICORIN SEA						
Product	2011-12		2012-13		2013-14	
	Qty	Value	Qty	Value	Qty	Value
Poultry Products	545388.18	30017.6	486412.95	30059	389472.57	27948.3
Cucumber and Gherkins(Prepd. & Presvd)	53360.33	15009.17	46949.84	16701.75	39354.75	17365.65
Fresh Onions	21845.63	3779.64	19209.17	4567.56	89403.05	15957.67
Floriculture	9217.79	9655.98	7942.34	11317.22	4985.69	9750.72
Dairy Products	164.38	351.72	622.83	1922.23	3589.33	8477.71

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

APEDA

Non Basmati Rice	29830.03	7843.21	32230.79	8916.57	24305.48	7670.39
Albumin(Eggs & Milk)	892.1	3413.78	1188.03	6512.27	1019.9	6502.29
Maize	318075.7	41578.55	188474.16	26660.06	43713.9	6415.43
Other Fresh Vegetables	31000.17	3289.09	13513.25	2078.47	28860.5	6009.55
Other Processed Fruits & Vegetables	6815.45	3347.96	3014.12	2253.47	3428.87	2560.28
Other Fresh Fruits	4992.22	2209.85	3768.94	2045.05	3880.18	2446.27
Milled Products	3940.68	808.77	15886.62	3732.3	9140.93	2250.4
Miscellaneous Preparations	1926.05	995.78	2461.21	1278.44	1721.12	1691.94
Cereal Preparations	2660.79	1498.64	2271.28	1494.61	1985.79	1515.22
Jaggery & Confectionery	16432.7	5187.75	19333.8	5558	2535.47	1010.61
Mango Pulp	12776.01	3890.35	11081.56	3748.62	1705.6	768.14
Other Cereals	4048.3	529.78	2765.78	582.57	1575.9	410.98
Basmati Rice	12.77	6.59	30.84	12.7	103.42	104.05
Groundnuts	3647.34	1640.72	1092.09	615.82	173.5	101.43
Pulses	1007.79	415.4	448.09	175.06	192.49	87.35
Fruits & Vegetables Seeds	12.95	21.32	66.31	318.53	21.41	63.65

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Casein	0	0	1	1.86	10.23	19.53
Cocoa Products	0.28	0.19	4.81	9.22	14.23	15.53
Fresh Mangoes	2.6	4.59	45.11	13.48	8.63	6.82
Fresh Grapes	21.16	13.41	111.94	58.58	6.93	6.17
Guargum	5.1	1.42	0	0	3	4.92
Natural Honey	28.16	19.9	12.05	7.52	2.25	4.71
Dried & Preserved Vegetables	138.91	29.23	752.52	277.33	3.33	2.56
Alcoholic Beverages	1.1	1.16	1.61	0.81	10.64	1.88
Processed Meat	0	0	0	0	1.74	1.52
Wheat	2	0.5	0	0	0.1	0.03
Animal Casings	13.6	8.95	0	0	0	0
Other Meat	0	0	0.1	0.12	0	0
Sheep/Goat Meat	0	0	0.99	1.58	0	0
Total	10,68,260.27	1,35,571.00	8,59,694.13	1,30,920.80	6,51,230.93	1,19,171.70

**Source:
DGCIS
Annual
Export**

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

	Value in Rs Lacs					
	2011-12		2012-13		2013-14	
Product	Qty	Value	Qty	Value	Qty	Value
Groundnuts	320456.55	207779.97	235410.82	175832.33	242133.82	150150.7
Non Basmati Rice	155671.82	45032.77	221132.96	57661.68	257502.64	74418.23
Mango Pulp	99193.16	36107.42	109340.31	39601.53	137009.48	54169.6
Other Processed Fruits & Vegetables	57654	27916.61	67773.17	35698.32	82940.88	52188.89
Wheat	16.47	2.64	251610.74	42328.48	233492.78	39355.44
Fresh Onions	110914.35	26278.28	100488.89	24938.98	88268.12	38716.49
Maize	739890.82	103248.27	493380.4	73487.17	225445.5	33869.58
Cucumber and Gherkins(Prepd. & Presvd)	75314.43	22080.74	69402.65	24466.42	53946.85	23732.23
Dairy Products	639.46	1401.61	10475.77	16903.9	11206.73	23294.57
Buffalo Meat	5063.89	6627.07	8652.67	12923.69	12655.1	22502.74
Cereal Preparations	19232.4	19515.69	15611.48	17313.72	15250.26	20135.11
Miscellaneous Preparations	7687.97	4811.09	10097.88	7359.9	17641.84	11179.38

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Jaggery & Confectionery	13499.79	4336.65	14642.22	4640.42	21604.93	7847.3
Floriculture	5385.42	6163.79	4328.08	7260.24	4160.62	7766.52
Poultry Products	3514.53	2335.64	3875.17	3720.11	4123.31	6281.38
Other Fresh Fruits	10784.44	3605.16	9676.92	3556.29	13172.66	5361.2
Alcoholic Beverages	3161.56	5066.96	2676.86	6211.37	2877.63	3345.36
Other Fresh Vegetables	873.53	263.26	450.19	156.69	4413.82	1813.24
Albumin(Eggs & Milk)	143.36	581.05	265.53	1267.32	296.92	1749.2
Milled Products	4402.83	1040.58	4500.03	1222.76	3585.59	1445.45
Other Cereals	1249.22	224.27	1144.48	337.88	4716.59	949.71
Pulses	724.49	379.11	605.11	367.87	1190.51	633.82
Basmati Rice	949.25	219.27	240.43	179.71	838.95	594.3
Fruits & Vegetables Seeds	295.52	327.52	289.07	370.71	581.96	395.81
Cocoa Products	683.22	610.17	321.38	545.33	114.99	271.4
Dried & Preserved Vegetables	118.22	57.05	2884.6	1548.01	51.21	72.22
Fresh Mangoes	135.98	46.8	151.5	53.32	118.56	70.08
Fresh Grapes	114.64	42.21	1.65	2.06	69.5	61.22
Natural Honey	10.54	16.81	10.76	16.5	14.25	22.17
Sheep/Goat Meat	0	0	0	0	7.2	8.8
Guargum	8.63	8.91	0.77	2.05	1.79	6.73
Casein	1.81	2.39	52.71	133.13	2.64	4.28
Walnuts	0.16	0.51	0.16	0.72	0.08	0.44

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Animal Casings	0	0	0.13	0.17	0	0
Processed Meat	0.01	0.07	0.76	0.77	0	0
Total	16,37,792.47	5,26,130.34	16,39,496.25	5,60,109.55	14,39,437.71	5,82,413.59

Source: DGCIS Annual Export

Appendix 1 B.B.A - Details of export of agri commodities from Major airports

Product	2011-12		2012-13		2013-14	
	Qty	Value	Qty	Value	Qty	Value
Other Fresh Vegetables	2962.39	1247.34	3518.81	1525.24	3714.61	2039.3
Floriculture	242.16	211.73	550.54	555.7	649.64	720.13
Dried & Preserved Vegetables	251.91	92.03	521.76	234.81	1284.97	501.13
Poultry Products	0	0	11225.9	614.81	2144.57	354.5
Fresh Mangoes	575.42	235.25	452.59	236.15	352.38	291.95
Miscellaneous Preparations	145.77	425.19	388.82	322.35	115.88	289.5
Cereal Preparations	46.64	63	117.75	198.71	88.22	198.02
Dairy Products	102.71	182.77	82.81	132.6	111.18	176.18
Fruits & Vegetables Seeds	44.3	538.33	7.35	154.58	13.92	172.99
Other Processed Fruits & Vegetables	179.31	111.36	186.11	403.98	100.83	106.58
Other Fresh Fruits	1255.7	198.39	490.23	133.05	92.87	97.57
Jaggery & Confectionery	62.54	42.04	24.38	57.42	21.49	43.51
Sheep/Goat Meat	60.66	115.12	2.88	2.4	6.28	19.06
Pulses	0	0	0	0	39.67	18.37
Fresh Onions	2.4	0.44	35.69	14.49	26.24	13.45
Fresh Grapes	0.55	0.09	0.34	0.22	7.41	11.67
Alcoholic Beverages	4.67	29.41	3.42	14.24	2.51	10.26
Cocoa Products	4.76	5.49	0.2	0.27	0.59	4.49

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

Milled Products	0.51	0.3	1.07	1.38	4.47	3.42
Mango Pulp	4.09	2.96	8.6	7.26	2.96	2.47
Basmati Rice	0.15	0.05	0	0	0.4	0.79
Walnuts	0	0	0	0	0.25	0.27
Wheat	0	0	0	0	0.95	0.26
Cucumber and Gherkins(Prepd. & Presvd)	98.63	33.56	0.06	0.02	0.23	0.17
Non Basmati Rice	0.49	0.13	0.27	0.1	0.38	0.16
Albumin(Eggs & Milk)	1.71	10.54	9.45	29.92	0	0.07
Other Meat	0	0	0	0	0.05	0.05
Casein	0	0	0	0	0	0.02
Groundnuts	1.93	1	0	0	0.04	0.01
Maize	0	0	0.03	0	0	0
Natural Honey	0	0	0	0	0	0
Other Cereals	0	0	0.02	0.01	0	0
Processed Meat	29.13	75.21	1.07	1	0	0
Total	6,078.53	3,621.73	17,630.15	4,640.71	8,782.99	5,076.35

Source: DGCIS Annual Export

Product	2011-12		2012-13		2013-14	
	Qty	Value	Qty	Value	Qty	Value
Fruits & Vegetables Seeds	131.87	3206.67	82.78	4452.05	96.65	5356.68
Other Fresh Vegetables	3116.4	2101.37	2802.48	3197.79	4341.44	5135.44
Floriculture	869.81	2445.87	1017.81	3783.7	1298.29	4286.25
Miscellaneous Preparations	532.56	806.12	2034.99	1245.82	498.97	1587.35
Poultry Products	2.22	2.86	7833.34	669.48	2585.85	422.1
Other Fresh Fruits	264.02	112.5	327.31	218.23	440.9	420.29
Albumin(Eggs & Milk)	0	0	0	0	10.11	61.34
Cucumber and Gherkins(Prepd. & Presvd)	3.78	6.01	1.23	0.81	135.42	57.62
Fresh Mangoes	17.04	11.39	13.86	13.8	29.85	34.99
Other Processed Fruits & Vegetables	14.21	11.37	37.62	26.26	27.43	30.67
Dried & Preserved Vegetables	13.15	15.8	141.11	205.86	6.34	25.19
Mango Pulp	10.02	6.68	2.96	0.4	19.96	11.39
Jaggery & Confectionery	3.9	5.02	1.9	4.44	2.09	9.29
Cereal Preparations	2.17	2.83	4.85	6.29	3.16	6.58
Fresh Onions	23.49	4.7	14.27	7.28	2.26	3.79
Alcoholic Beverages	0.92	1.97	2.26	4.73	3.35	3.53
Dairy Products	0.15	0.06	0	0	0.85	3.35
Natural Honey	3.43	7.14	4	2.58	0.25	0.95
Maize	0.12	0.06	0.51	0.81	0.42	0.91

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Non Basmati Rice	0	0	0.03	0.01	0.35	0.5
Fresh Grapes	0.15	0.16	3.75	5.8	0.09	0.12
Cocoa Products	3.77	13.76	2.69	2.51	0.07	0.09
Pulses	3.5	3.94	0.04	0.02	0.04	0.05
Milled Products	2.65	0.33	1.13	0.14	0.26	0.04
Other Cereals	0	0	0.08	0.02	0.12	0.03
Basmati Rice	0	0	0	0	0.01	0.01
Groundnuts	5	2.64	10	3.93	0	0
Total	5,024.33	8,769.25	14,341.00	13,852.76	9,504.53	17,458.55

Source: DGCIS Annual Export

Value in Rs Lacs

Qty in MT

Port: MUMBAI AIR

Product	2011-12		2012-13		2013-14	
	Qty	Value	Qty	Value	Qty	Value
Other Fresh Vegetables	41360.6	16920.24	42211.57	20804.44	40405.9	22552.13
Sheep/Goat Meat	3782.21	10311.66	3779.04	11690.13	3204.07	11112.85
Floriculture	1446.83	4808.34	1109.97	4591.29	1202.76	7175.64
Fruits & Vegetables Seeds	187.85	3718.52	226.06	6143.42	269.91	6950.81

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Fresh Mangoes	5545.62	3189	6633.37	5950.02	5435.25	6943.48
Other Fresh Fruits	14532.24	2657.82	15323.51	4016.67	8502.08	5335.18
Miscellaneous Preparations	809.66	1713.67	841.49	2785.03	524.04	3513.01
Poultry Products	15764.55	1697.79	13604.58	1034.62	13625	3455.41
Cocoa Products	359.91	328.77	68.54	262	124.35	663.76
Animal Casings	164.75	443.58	128.02	254.67	136.98	503.11
Jaggery & Confectionery	115.42	89.01	120.4	196.56	110.09	429.87
Fresh Grapes	208.05	204.76	326.43	325.2	204.06	260.64
Dried & Preserved Vegetables	11.69	15.53	509.18	437.28	76.51	223.85
Maize	75.5	61.83	2.01	3.09	96.08	220.01
Fresh Onions	1025.12	84.86	1208.16	115.13	496.45	209.7
Guargum	106.88	207.94	40.47	181.9	42.65	168.48
Other Processed Fruits & Vegetables	96.16	147.75	100.31	149.9	114.46	153.63
Albumin(Eggs & Milk)	251.35	654.14	14.31	435.51	3.35	147.86
Cereal Preparations	197.54	260.31	118.48	158.27	70.43	125.26
Alcoholic Beverages	75.21	781.55	25.1	169.25	51.83	90.05
Casein	4.88	51.82	9.06	135.91	3.26	40.31

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Dairy Products	64.09	115.59	42.78	88.51	7.3	28.85
Natural Honey	14.32	43.96	2.22	17.16	1.69	20.01
Mango Pulp	22.71	24.22	4.92	4.58	9.37	17.24
Groundnuts	0.22	0.09	0	0	5.49	12.5
Milled Products	31.72	6.41	20.02	5.6	8.25	2.61
Other Cereals	1.3	0.09	0.25	0.07	0.25	1.18
Non Basmati Rice	1.04	1.11	0.05	0.02	1.34	0.87
Cucumber and Gherkins(Prepd. & Presvd)	0.12	0.43	0.14	1.1	0.49	0.36
Basmati Rice	0	0	0.1	0.05	0.18	0.14
Buffalo Meat	1412.81	3323.9	34.29	164.34	0.05	0.05
Processed Meat	0	0	0.02	0.05	0	0.02
Other Meat	5	5.71	9.4	19.6	0	0
Pulses	2.18	3.57	2.66	1.27	0	0
Walnuts	0	0	0.03	0.09	0	0
Wheat	0.06	0.11	0	0	0	0
Total	87,677.59	51,874.08	86,516.94	60,142.73	74,733.92	70,358.87

Source: DGCIS Annual Export

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Appendix 1 C - Questionnaire

For Exporter / Exporter Association

Questionnaire Excel Sheet					
Name of respondent					
designation					
name of firm					
Address					
Phone Number					
Mobile number					
e-mail id					
APEDA Products exported:					
Name of Product	Quantity Exported (appox. - annual)	Value exported (appox. - annual)	Type of activity (manufacturing / trading)	Number of units / offices (in case of trading)	Total Processing Capacity (if applicable)
P1					
P2					
P3					

Study on identification of export oriented integrated infrastructure for agri products from Karnataka & Tamil Nadu - APEDA (Agriculture Produce Export Development Authority)

P4					
P5					
RAW MATERIAL (RM)	P1	P2	P3	P4	P5
Raw material (name)					
RM Volume					
RM Value					
Quantity Stored					
Storage days					
Type of storage					
Safety measures adopted					
Packaging Details					
Costs related to RM	P1	P2	P3	P4	P5
Transportation cost					
Storage cost					
Packaging Cost					
Any other process					
Any other (s)					
Services used for RM	P1	P2	P3	P4	P5
Testing /Certification					
Grading / Sorting					
Procurement					
Any other srevises					

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FINAL PRODUCT	P1	P2	P3	P4	P5
Infra & services needed					
Quantity Stored					
Storage days					
Type of storage					
Safety measures adopted					
Packaging Details					
Testing /Certification					
Marketing support					
Transportation & Logistics					
Transportation volume					
Transportation frequency					
Transportation cost per unit					
Any other related heads					
FINAL PRODUCT	P1	P2	P3	P4	P5
Documentation					
time taken per shipment					
cost per shipment					
no of documents					
others 1					
others 2					

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Infrastructure requirement post harvest					
<i>Infrastructure type</i>	RM1	RM2	RM3	RM4	RM5
Dry Storage	Y/N	Y/N	Y/N	Y/N	Y/N
Cold Storage	Y/N	Y/N	Y/N	Y/N	Y/N
Other storage	Y/N	Y/N	Y/N	Y/N	Y/N
grading sorting facilities	Y/N	Y/N	Y/N	Y/N	Y/N
transportation	Y/N	Y/N	Y/N	Y/N	Y/N
Any other infra 1	Y/N	Y/N	Y/N	Y/N	Y/N
Any other infra 2	Y/N	Y/N	Y/N	Y/N	Y/N
<i>Capacity Needed (shortage felt)</i>	RM1	RM2	RM3	RM4	RM5
Dry Storage					
Cold Storage					
CA Storage					
Other storage					
grading sorting facilities					
transportation					
Any other infra 1					
Any other infra 2					
<i>Capacity Needed (Location)</i>					

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Dry Storage					
Cold Storage					
CA Storage					
Other storage (e.g. with ripening chambers)					
grading sorting facilities					
transportation					
Any other infra 1					
Any other infra 2					
Services Needed					
testing facility					
price information					
farmer certification					
product certification					
GI registration					
logistics					
others 1					
others 2					
others 3					
Services Needed (Location)					
testing facility					
price information					

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farmer certification					
product certification					
GI registration					
logistics					
others 1					
others 2					
others 3					
Infrastructure requirement end product					
<i>Infrastructure type</i>	P1	P2	P3	P4	P5
Dry Storage	Y/N	Y/N	Y/N	Y/N	Y/N
Cold Storage	Y/N	Y/N	Y/N	Y/N	Y/N
CA Storage	Y/N	Y/N	Y/N	Y/N	Y/N
storage at ports	Y/N	Y/N	Y/N	Y/N	Y/N
container/facilities	Y/N	Y/N	Y/N	Y/N	Y/N
Other facilities at port	Y/N	Y/N	Y/N	Y/N	Y/N
Any other infra 1	Y/N	Y/N	Y/N	Y/N	Y/N
Any other infra 2	Y/N	Y/N	Y/N	Y/N	Y/N
<i>Capacity Needed (total)</i>					
Dry Storage					

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Cold Storage					
CA Storage					
storage at ports (sea/air)					
container/facilities					
Other facilities at port					
Any other infra 1					
Any other infra 2					
Capacity Needed (Location)	P1	P2	P3	P4	P5
Dry Storage					
Cold Storage					
CA Storage					
storage at ports					
container/facilities					
Other facilities at port					
Any other infra 1					
Any other infra 2					
Services Needed	P1	P2	P3	P4	P5
testing facility					
price information					
producer certification					

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product certification					
GI registration					
logistics					
HACCP / safety certification					
others 1					
others 2					
Services Needed (Location)					
testing facility					
price information					
producer certification					
product certification					
GI registration					
logistics					
HACCP / safety certification					
others 1					
others 2					

At Raw material procurement stage

problem 1

problem 2

problem 3
problem 4
problem 5

problem 1 Solution
problem 2 Solution
problem 3 Solution
problem 4 Solution
problem 5 Solution

At final product stage

problem 1
problem 2
problem 3
problem 4
problem 5

problem 1 Solution
problem 2 Solution
problem 3 Solution
problem 4 Solution
problem 5 Solution

Appendix 1 D - Respondents

Appendix 1 D.D - Exporters

Exporters Name	Company	Mobile No.	Email Id
R. Muthu	R.M. NETRA EXIM	9500617343, 9444393335	rmnetraexim@gmail.com
	S.V.N. EXPORTS	9500617343, 9444393335	svnnetra@gmail.com
V.S. Vishnu Prasad, M.Sc.	The United Export Agents	91 9952829390, +91 422 4388247	info.unitedexport@gmail.com
N. Ambika	Vishwaroopa Enterprises	9790755586, 9884121886	nambika65@gmail.com, vishwaroopaenterprises@gmail.com
K. Gnanasekar	Maha Agricultural Products Pvt Ltd	91 9940178481	sales@mahaagro.in
K. Ravindran	Jayanthi Exports	91- 9003111432, 9443163560	business@jayanthiexports.com, jayanthiexports@gmail.com
S. Srimathi	A.A. Exports	9841275710	aaexports.suresh@gmail.com
K. Namasivayam	Vast Exporters	91 9789959552, 8608906987	namasivayamk310@gmail.com, info@vastexporters.in
P.Srinivasan	Natural Products Export Corpn. Ltd.	91 98417 24444	srinivasan@npecindia.com
V.R.Naik	MYCAAN (Mysore Fruit Products Pvt Ltd)	Mob. +91 9448065724	www.mysorefruits.com
		Tel No. +91 8023491972, 23492457	
Dr. Prassanna D	Way 2 Agribusiness India Pvt. Ltd	Mob.+919449004956	dr.prasannad@way2agribusiness.com

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V.Jhansi Laxmi	South India Floriculture Association	Mob: +91-9448276041	contact@way2agribusiness.com
		Tel No.: 080 32710707	Laxmivj4@gmail.com
Dr Jayaprakash Rao	South India Floriculture Association	Mob: 9341241389	sifabang@gmail.com
		Tel No: +91-80-23336565	sifabang@gmail.com
M.R. Reddy	Virdis Vatika Fresh Pvt. Ltd	Mob: +91 9986278105	hitechroses@yahoo.com
			virdisvfresh@gmail.com
Vijay Reddy	Y Cook India Pvt Ltd	Mob: +91 9543095430	vvatikafresh@gmail.com
		Tel No:080 40903663	vijay.reddy@ycook.in
V.H.PRASAD	Blooms & Greens	Mob: +91 9035177188	bloomsandgreens@gmail.com
		Tel no.08032710707	

Appendix 1 D.D - Other respondents

1. Shriram Institute for Industrial Research, 14-15 Sadarmangla Industrial Area, Whitefield Road, Bangalore 560 048, Tel: 080-28410172, 28410165/166/167, Fax :28410189, sribglr@vsnl.com; sribglr@bgl.vsnl.net.in; ark@shriraminstitute-bangalore.org;
2. TUV Sud South Asia Pvt. Ltd., No. 151, 2nd C Main, 2nd stage, Peenya Industrial Estate, Bangalore 560058, Tel: 080-67458000 Fax: 080-67458058, suresh.kumar@tuv-sud.in; meena.mariappan@tuv-sud.in; farhan.ayasha@tuv-sud.in;
3. S.P. Shastri, Chief Manager, Container Corporation of India Ltd. Inland Container Depot, Whitefield Road, Bangalore-560066, spshastri@concorindia.com, 080-28451329
4. N. Sreekumar, Chief General Manager, Container Corporation of India Ltd., 8th Floor, CAO/CN Office, Southern Railway, EVR Periyar Salai, Egmore, Chennai-600008, sreekumar@concorindia.com
5. Bureau Veritas Consumer Products Services, India Private Limited (BVCPS), F-2 Phase-III Thiruvika Industrial Estate, Chennai 600 032, Tel: 044-4967 4000 Fax: 22491651, balasubramanian.k@in.bureauveritas.com;

6. SGS India Pvt. Ltd., Opposite to State Bank of India, 28 B/1 (SP), 28 B/2 (SP) 2nd Main Road Ambattur Industrial Estate, Chennai 600 058, Tel: 044-66693109 Fax: 24963075, av.abraham@sgs.com; dipjvoti.banerjee@sgs.com;
7. T A Labs Private Limited, No. 17 NewStreet Kottur, Chennai 600 085, Tel: 044-24474505, 64551505, ubharatraj@trueanalytica.com; talabs@trueanalytica.com; ubharatraj@gmail.com
8. SMS Labs Services Private Limited, 39/6 Thiruvallur High Road Puduchatrm, Post Thirumazhisai Via Poonamalee TK, Chennai 600 124, Tel: 044-26811997, 26811993, Cell: 09444418694, sharadhangm@gmail.com; smslab2012@yahoo.in;
9. Mr. Sathyamurthy Krishna Giri – Mango Cluster Representative (Krishnagiri) – 09443262912
10. Mr. B. A. C. Gowda – representative from Gherkin growers association
11. Mr. Avinash, Aerosea Logistics Limited, Mb.: +91 99801 55852, Email: avinash@aeroseaglobal.com
12. Mr. Rajiv Sathe, Domain Consultant – Shipping & logistics' || Trainer – Ocean & air freight management and international logistics' management, Mb.: +91 98230 15374, Email: rajiv@rsathe.com
13. Mr. Mayur Agarwal, Agri - entrepreneur and exporter, Mb.: +91 97537 04444

Appendix 1 E - Renewable Energy

Appendix 1 E.E - Introduction

A greenhouse' (also called a glasshouse or hothouse) is a building or complex in which plants are grown. These structures range in size from small sheds to industrial-sized buildings. A miniature greenhouse is known as a cold frame.

Commercial glass greenhouses are often high tech production facilities for vegetables or flowers. The glass greenhouses are filled with equipment like screening installations, heating, cooling, lighting and also may be automatically controlled by a computer to maximize potential growth. A greenhouse is a structural building with different types of covering materials, such as a glass or plastic roof and frequently glass or plastic walls; it heats up because incoming visible sunshine is absorbed inside the structure. Air warmed by the heat from warmed interior surfaces is retained in the building by the roof and wall; the air that is warmed near the ground is prevented from rising indefinitely and flowing away. This is the same mechanism as the "greenhouse effect". Green house production requires the use of large amount of energy, water and agro-chemicals and it usually generates huge quantities of waste to be disposed of.

The management of the greenhouse environment is strongly reliant on temperature manipulation. Temperature manipulation is critical to influencing plant growth and morphology and so is the major strategy in the environmental modification of the crops. Major points for energy consumption of the green hose environment include- Greenhouse Ventilation and Greenhouse Heating.

Appendix 1 E.E - Greenhouse Ventilation

Ventilation is one of the most important components in a successful greenhouse. If there is no proper ventilation, greenhouses and their growing plants can become prone to problems. The main purposes of ventilation are to regulate the temperature and humidity to the optimal level, and to ensure movement of air and thus prevent build-up of plant pathogens that prefer still air conditions. Ventilation also ensures a supply of fresh air for photosynthesis and plant respiration, and may enable important pollinators to access the greenhouse crop.

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Ventilation can be achieved via use of vents and recirculation fans. Ventilation is either forced or natural. The forced ventilation uses electricity which is used to feed greenhouse cooling such as fans, fog and pad evaporative system

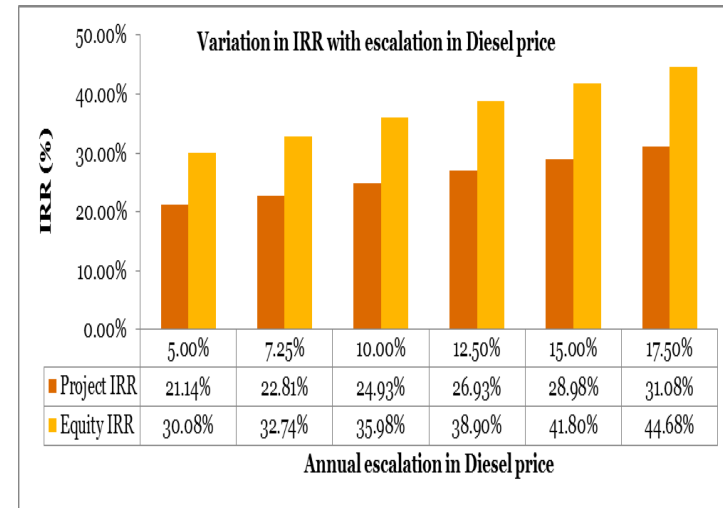
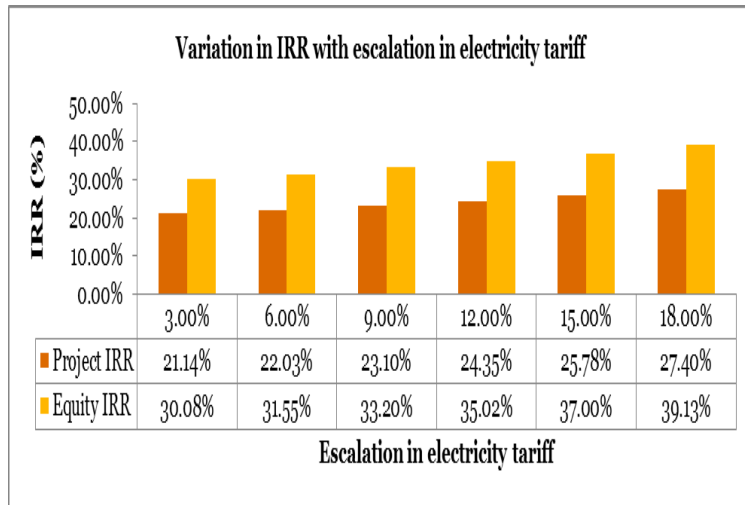
Appendix 1 E.E - Greenhouse heating

Heating or electricity is one of the most considerable costs in the operation of greenhouses across the globe, especially in colder climates. The main problem with heating a greenhouse as opposed to a building that has solid opaque walls is the amount of heat lost through the greenhouse covering. Since the coverings need to allow light to filter into the structure, they conversely cannot insulate very well.

During the winter season, electrical energy is being applied for the heating systems based on the ground source heat pumps and pond water heat pumps.

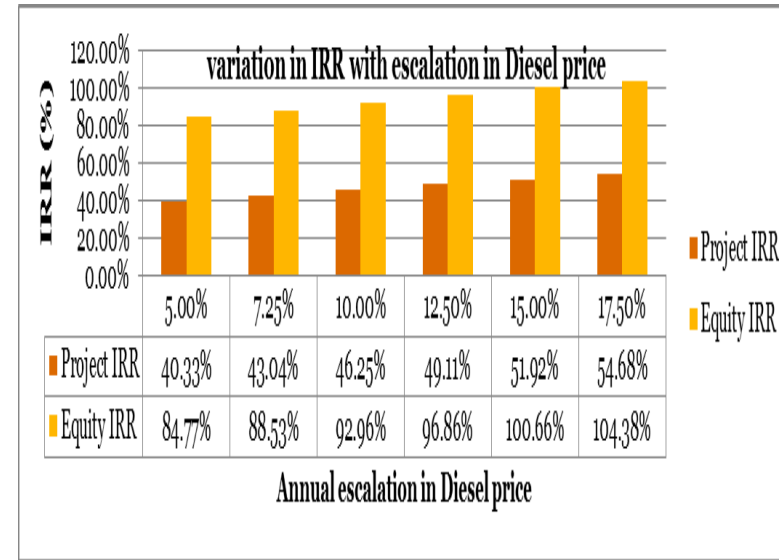
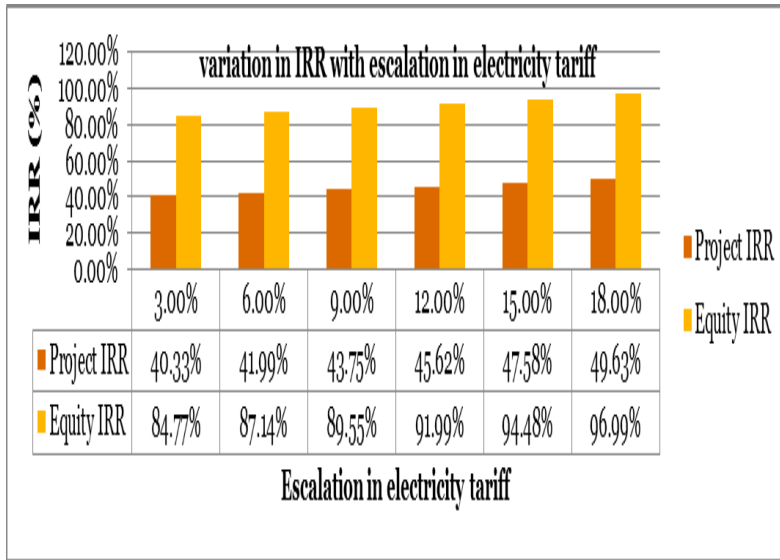
Appendix 1 E.E.C - Scoping solar PV/gasifier systems

The existing greenhouse system has 20Hp of electrical load. Electricity is being used to feed greenhouse equipment's particularly employed for ventilation, heating and lighting systems. Electricity is essentially being generated from DG sets or is being sourced from the grid to meet the load requirement. In order to reduce the reliance on the grid and DG power, it is imperative to look for renewable power solutions. Solar PV systems, either stand alone or grid interactive, of appropriate size can be used to meet the load requirements during the day time by replacing the grid and DG power. A typical illustration on expected returns on investment on employing solar PV system of 75Kw (without batteries) for meeting the in-house load requirement through replacing the usage of grid power and DG power has been presented below. The assumptions for the calculation are presented in exhibit 1.



Additionally, electricity storage by means of batteries in the stand alone system could be employed to ensure power continuous power. However, in case, if batteries are being employed, the required capacity of the solar PV plant increases and it also entails high investment and maintenance cost.

It is also pertinent to mention that since the identified greenhouse agricultural production site is amid the agricultural area, planning and implementing the biomass gasifier based off-grid power installation could be also contemplated. Biomass gasifier based power unit would ensure continuous power supply to meet the load requirements. . A **typical illustration** on expected returns on investment on employing biomass gasifier system of 250Kw for meeting the in-house load requirement through replacing the usage of grid power and DG power has been presented below The assumptions for the calculation is presented in Exhibit 2.



In light of the aforementioned, it would be prudent to adopt renewable measures to meet the energy requirements of the load for the identified plant. In order to meet this objective, it is envisaged that following activities can be conducted.

Appendix 1 E.E.C - Scope of Services:

With regards to meeting the load requirements by replacing the usage of grid and DG power with solar PV unit, following activities would be endeavored:

- Conducting site assessment and load profiling of the unit.
- Conducting solar resource assessment

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- Estimating size of plant and yield estimation
- Preparation of Project Feasibility Reports.

With regards to meeting the load requirements by replacing the usage of grid and DG power with biomass gasifier unit, following activities would be endeavored:

- Conducting site assessment, load profiling of the unit and Estimating size of plant
- Conducting biomass resource assessment and subsequently its power potential
- Preparation of Project Feasibility Reports

Exhibit 1

Solar Power Plant related assumptions				Actual
S. No.	Assumption Head	Sub-Head	Unit	Solar PV
1	Power Generation	Installed Power Generation Capacity	MW	0.075
		Annual Deration Factor	%	0.25%
		Capacity Utilisation Factor	%	17.2%
2	Time period	Life of the project	Years	25
		Construction period	Months	12
3	Project Cost	Power Plant Cost	Rs Lakhs	83.80
		MNRE subsidy	Rs Lakhs	25.14
		Plant overall cost	Rs Lakhs	58.66
4	Financial Assumptions	Debt	%	70.00%
		Equity	%	30.00%
		Upfront equity	%	25.00%
		Interest Rate	%	12.30%
		Return on equity for first 10 years	% p.a	16.00%
		Return on Equity after 10 years	% p.a	16.00%

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5	Tax and depreciation	Income Tax	%	32.45%
		MAT Rate	%	20.01%
		Depreciation Rate - First 12 years	%	5.83%
		Depreciation Rate - Remaining Years	%	1.54%
		Years for 5.28% rate	Years	12
		Salvage value	%	10.0%
		Depreciation as per Income tax Act		15.0%
		Accelerated depreciation rate		80%
		Salvage value as per IT Act		5%
6	Working Capital	O&M Charges	Months	1
		Receivables for Debtors	Months	2
		Maintenance Spare	% of O&M expenses	15%
		Interest On Working Capital	%	12.8%
7	Operation & Maintenance	O&M charges for FY 2011-12	Rs Lakhs	0.825
		Total O & M Expenses Escalation	%	5.72%
8	Tariff from Grid and DG Set	Tariff from Grid	Rs./ kWh	7
		Tariff from DG set	Rs./ kWh	15.71
		Cost of Diesel	Rs./Litre	55

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	Usage of Grid power	%	50%
	Usage of DG set power	%	50%
	Escalation of grid tariff	%	3%
	Escalation of DG set tariff	%	5%

Exhibit 2

Biomass gasifier Power Plant related assumptions				Actual
S. No.	Assumption Head	Sub-Head	Unit	Biomass Gasifier
1	Power Generation	Installed Power Generation Capacity	MW	0.25
		Auxiliary Consumption	%	10%
		PLF	%	75%
2	Time period	Life of the project	Years	20
3	Project Cost	Power Plant Cost (including IDC)	Rs Lakhs	211.28
		MNRE subsidy	Rs Lakhs	25
		Plant overall cost	Rs Lakhs	186.28
4	Financial Assumptions	Debt	%	70.00%
		Equity	%	30.00%
		Upfront equity	%	25.00%

		Interest Rate	%	12.30%
5	Tax and depreciation	Income Tax	%	32.45%
		MAT Rate	%	20.01%
		Depreciation Rate - First 12 years	%	5.83%
		Depreciation Rate - Remaining Years	%	2.51%
		Salvage value	%	10.0%
		Depreciation as per Income tax Act		15.0%
		Salvage value as per IT Act		5%
6	Working Capital	O&M Charges	Months	1
		Receivables for Debtors	Months	2
		Maintenance Spare	% of O&M expenses	15%
		Interest On Working Capital	%	12.8%
7	Operation & Maintenance	O&M charges for FY 2013-14	Rs Lakhs	10
		Total O & M Expenses Escalation	%	5.72%
8	Tariff from Grid and DG Set	Tariff from Grid	Rs./ kWh	5.5
		Tariff from DG set	Rs./ kWh	15.71
		Cost of Diesel	Rs./Litre	55
		Usage of Grid power	%	58%

Usage of DG set power	%	42%
Escalation of grid tariff	%	3%
Escalation of DG set tariff	%	5%

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