REPORT OF

THE COMMITTEE ON ENCOURAGING INVESTMENTS IN SUPPLY CHAINS INCLUDING PROVISION FOR COLD STORAGES FOR MORE EFFICIENT DISTRIBUTION OF FARM PRODUCE

Development Policy Division
Planning Commission
Government of India
New Delhi

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The Report of the "Committee for Encouraging Investments in Supply Chains Including Provision for Cold Storages for More Efficient Distribution of Farm Produce" is presented hereunder:-

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Member, Planning Commission
Chairman

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Principal Adviser (DPPP), Planning Commission - Member Secretary

Dated: May 22, 2012
Place: New Delhi

THE COMMITTEE

ON

Encouraging Investments in Supply Chains Including Provision for Cold Storages for More Efficient Distribution of Farm Produce

Members of the Committee

Chairman

Dr. Saumitra Chaudhuri, Member, Planning Commission

Members

Shri T Nanda Kumar, Member, National Disaster Management Authority
Secretary, Department of Industrial Policy & Promotion
Secretary, Department of Food & Public Distribution
Secretary, Department of Agriculture & Cooperation
Secretary, Department of Animal Husbandry, Dairying & Fisheries
Secretary, Ministry of Food Processing Industries
Shri Rakesh Bharti Mittal, Chairman, CII National Council on Agriculture
Shri B Thiagarajan, Chairman, CII Task Force on Cold Chain Development
Shri S Sivakumar, Chief Executive, Agri Business Division, ITC Ltd.

Member Secretary

Dr. Ashok Sahu, Principal Adviser (Development Policy and Perspective Planning), Planning Commission

Terms of Reference (ToR)

(i) To assess the existing framework of supply chains, including cold storages, in respect of farm products;

(ii) To make an assessment of the future requirements over the next 6 years i.e. up to the end of the Twelfth Five Year Plan;

(iii) To lay down a policy framework by which the supply chains can be dovetailed with the organized retail chains to achieve quicker and more efficient distribution of farm products and minimize wastage;

(iv) To recommend on policy initiatives, suitable schemes and investments required for this purpose.

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Executive Summary

0.i The domestic and export demand for Horticultural Produce and other perishable items produced by the Animal Husbandry and Fisheries sector has increased rapidly over the past two decades. This is significantly higher than the demand for cereals.

0.ii The supply-side response to this increased demand has been fairly robust and the production has increased both on account of extension, that is, more and more farmers taking up this activity and also on account of higher yields due to adoption of modern technology. This has also been facilitated by improved road and telecom connectivity across the country.

0.iii In 2011/12 production of fruits and vegetables was 2.7 and 2.6 times that of the output level two decades ago, i.e. in 1991/92. This expansion was much higher than that for cereals, where the 2011/12 output level was 1.5 times that of 1991-92. A similar and more marked difference may be seen in the most recent past decade (2001/02 to 2011/12) where output of fruits and vegetables has increased by 80 and 69 per cent respectively over 2001/02, while output of cereals has grown by 17 per cent in the same period.

0.iv Horticulture, animal husbandry and fisheries are particularly accessible to small and marginal farmers who have less land, but also more family labour.

0.v Various schemes of the Central and the State Governments have been very useful in helping farmers gain access to affordable technologies and skills through subsidy and loans.

0.vi There is a clear need to continue and strengthen these efforts to increase the coverage of such activities as also to continually increase the yield of land, water and nutrients.

0.vii There is considerable wastage and spoilage in fresh produce as also sharp variation in prices during the season.

0.viii The rate of increase in the prices of fruit and vegetables have been higher than that for cereals especially in recent years, and is a major contributor to the sharp increase in the inflation level for primary food. Inflation in primary food has been greater than that of manufactured products and appears to be a driving force behind the higher inflationary pressure.

0.ix The proportionately higher increase in the prices of horticultural produce and other perishable farm items, suggest that (a) there is excess demand in the domestic market and (b) their higher output levels will indeed be absorbed by domestic consumption demand.

0.x This clearly justifies energetic efforts to encourage the continued expansion of horticulture, animal husbandry and fisheries, in order to service increasing domestic demand.

0.xi The data shows that for fruit and vegetables, the price at the first point of sale in large *mandis* as a proportion to the final retail price, is in the range of 25 to 40 per cent. This proportion may be lower, if smaller *mandis* were to be considered. The farm gate price is likely to be lower still,

because it is the aggregator who for the most part brings the produce to the *mandi* and there is the matter of his expenses, margin and wastage.

0.xii The inference is that (a) the benefits of demand expansion is not passing adequately to the farmer and (b) the benefits of higher production and productivity is not passing adequately to the consumer. All the evidence suggests that this is on account of the large deficiencies in the logistics system in between the farm to the final consumer.

0.xiii The push to build up storage capacity through cold chains has not been successful in vegetables and is limited for fruits. This seems to have been because the revenue or business model for cold storage on rental basis is not workable for cold chains in horticultural produce under the present institutional set up.

0.xiv The inefficiency in the logistic system appears to stem from (a) *Physical inadequacies*: Multiple handling of produce, inadequate cold chains which leads to high wastage and bunched-up supply. (b) The inadequacy in cold chains fails to smoothen out the supply which is seasonal, in relation to the demand which is constant and results in regular episodes of scarcity and glut conditions. (c) Institutional shortcomings flowing from the way in which APMC legislation has perpetuated a pre-modern framework with uncompetitive and non-transparent markets, in which commission agents do not have an incentive to change their age old method of operation. It must be noted that commission agents not only draw sustenance from the "closed shop" flowing out of licenses, but also function as financers by providing credit to their buyers and ready cash to farmers. Thus, the principal role of the commission agent is that of a financier-intermediary. (d) lack of adequate processing facilities which can help to increase the shelf life of the produce with complementary cold chains for the raw material as well as the finished produce.

0.xv The Committee is of the view that it is possible to visualize a sea change in the agricultural supply chain by way of a **strategy** that involves four points of intervention, namely: (1) Agents; (2) Market linkages (3) Institutional change and (4) Financing & incentives.

Economic Agents

0.xvi Two kinds of agents are envisaged. The first is co-operatives of farmers or producer companies established by growers and the second is private investors. It is desirable that both channels namely, cooperatives/producer companies and private sector enterprises have an equal opportunity to build up the cold chain infrastructure. In the private sector, it is generally felt that large outside companies may hesitate to actually invest in such facilities, but commission agents may participate.

Revenue or Business Model

0.xvii A rental model has a high risk emanating from uncertainties about demand for rental space. The investor is not necessarily in a position to interact with the downstream market, where the demand for such rentals can emanate. However, there are cold chain projects based on rental

models also and therefore, policies should be designed to support both models of cold storages viz. rental and price-arbitrage.

0.xviii The desired outcome in this instance must be in terms of market development and fairness to all stakeholders.

0.xix The only way to reduce the business risk of finding the rental space, is to link the investors in the cold storage, be it an outside investor or a commission agent or a joint venture between such entities, to an **anchor customer** who can come forward to take 50 or 75 or even 100 per cent of the available rental space. It is obvious that this **anchor customer** can only be a large downstream marketer and is most likely to be a large modern retailer or a food processing unit.

Negotiable Warehouse Receipts

0.xx The ***Warehousing Development and Regulatory Authority*** can play an important role by interfacing with cold chain networks so that farmers can either sell for ready cash at the electronic exchange market price or obtain ***Negotiable Warehouse Receipts***, which they can then use to secure financing from the banking system. This will increase the financial flexibility of farmers who are presently compelled to sell for ready cash at a subdued price.

0.xxi The price discovery mechanism must be reinforced by creating electronic exchanges so that at each of these cold chains there is a clearer picture about what the relevant prices are.

Market Linkages & Direct marketing

0.xxii The fact is that most farmers do not have the time or resources to bring their produce on a regular basis to the market place. Therefore, if the farmers have to gain meaningful access on this parallel chain of supply, there has to be an opportunity for the farmer to **directly market** their produce to the cold chain. One way certainly is the establishment of producer companies/ co-operatives. The other would be to allow private companies to undertake these transactions. However, in both cases certain **institutional changes** are required, which is taken up subsequently.

0.xxiii **Market Linkages**: The linkage to modern retail or food processing sector *via* the **anchor customers** for cold chain is indeed the most powerful means of creating a fair and equitable market where farmers obtain a good price and the consumers do not have to pay an excessively high price. Even if this mode of transaction accounts for only a fraction of the total, it has the potential of setting prices across-the-board.

0.xxiv Alongside this, in the cities there has to be a plan to modernize markets for fresh produce, so that small retailers are also able to enjoy the advantage of scale, efficiency and more transparent markets with wide access to information. In this connection, private and co-operative wholesale markets wherever possible, must be encouraged.

Institutional Change

0.xxv The most important change that is required in the institutional set up is to liberate perishable farm produce from the restrictions of the APMC. The best way to do this is for State Governments to remove "perishable farm produce" form the aegis of the APMC.

0.xxvi There have been many references to the Model APMC Act. However, it appears that the Model Act has many of the infirmities in the original APMC Act and is not helpful in developing a framework to modernize the farm logistics for perishable produce.

0.xxvii Several high powered committees have recommended changes that are consistent with what is being suggested here. State governments should remove "perishable farm produce" from the coverage of the APMC acts. This it is understood can be done by amending the schedule. Some of the committees have suggested that a compensatory mechanism be worked out for the fees that would be lost to the APMC markets. They have also suggested a ceiling of 2 per cent as fees. This seems to be a matter that can readily yield to a satisfactory resolution.

0.xxviii If such steps are taken, it will be advisable to put in place a regulatory and reporting authority which can create a simple framework for the operation of a cold chain. That would include one-time registration, depositing of fees and a requirement to submit periodic returns on an annual or semi-annual basis.

0.xxix It is advisable that such a regulatory agency work closely with the Warehouse Development and Regulatory Authority and other existing regulatory agencies so as to both minimize the creation of a new large and unwieldy set-up and to take advantages of economies of scale through regular exchange of information – especially in regard of transactions, price, volume and identity.

Financing and Incentives

0.xxx Cold chains have received some amount of financial support in the form of subsidies. The two recent high powered committees have suggested that (a) the cold chain supply system for horticulture and other fresh farm produce should be treated as infrastructure and (b) that they should qualify for the corresponding financing and tax incentives. This Committee endorses this view.

0.xxxi Both the Committee of State Agricultural Marketing Ministers as well as the Working Group of Consumer Affairs have recommended that the Public Private Partnership (PPP) model with Viability Gap Funding is an appropriate device to catalyze large scale investments in cold chain. However since every cold chain project is in many ways unique it may be difficult to structure a competitive bid.. This aspect needs further detailed study so that at least one cold chain project is taken up for viability gap funding. From this experience a firm conclusion can be drawn on how to proceed further in this matter.

0.xxxii In continuation of the above paragraph, the Committee would like to endorse the suggestion of a Viability Gap Funding model for PPP investments in this area. However, it would be necessary to work out the details involved. In the interim, the catalysis of investment in cold chains would have to depend on capital grants and some access to a slightly concessional line of finance. NABARD has a line of finance for this purpose and this should be fully used.

0.xxxiii There have been suggestions made by the two committees referred to previously to encourage FDI in this sector. Though FDI is permitted in cold-chains to the extent of 100%, through automatic route, for various reasons, inflows have not been significant. There is a need to encourage actual inflows which can be a powerful vehicle of bringing in both capital and logistics technology and expertise.

0.xxxiv The Union Budget 2012-13 has announced earmarking Rs.5000 crore out of the Rural Infrastructural Development Fund (RIDF) for creation of warehousing facilities. It is understood that there are some operational difficulties for utilizing this fund due to lack of clarity. There is a need for clear guidelines for utilization of this fund particularly in the context of other schemes for promoting cold storage facility.

0.xxxv Instead of a straight jacketed approach for encouraging cold chains, a matrix approach may be considered keeping in view the requirements of different types of horticultural products with varying cold storage requirements and markets relating thereto.

RECOMMENDATIONS

0.xxxvi Visualizing and encouraging both farmer co-operatives/producer companies and private enterprises to establish the cold chain network. Private enterprise would include all manner of outside investors – from standalone investors to processing companies and retail chains. The policy would actively encourage existing commission agents to set up cold chain facilities. FDI in cold chain must be encouraged

0.xxxvii The business model of the cold chain system would expressly **not** be pure price arbitrage. The objective should be to help smoothen out the episodic and concentrated arrival that is characteristic of the combination of a seasonal output and regular demand in the retail market. The result must be to ensure that the farmer receives a good price especially at the peak of the season, and that the consumers buy at a steady price. The return on investment in this cold chain system should be on a cost-plus basis, not on a price arbitrage model.

0.xxxviii Reduction of wastage, rationalization of margins and larger volumes would generate the economies to sustain the revenue model of the cold chain system.

0.xxxix It is necessary to reduce the business risk involved in investing in a cold chain system and that can only be achieved by providing a dynamic linkage of the cold chain system to the final retail market. This can be achieved by the tie-up between an **anchor customer** and the investor-provider of the cold chain rental space.

0.xxxx There must also be framework for **direct marketing** linking the farmer to the cold chain.

0.xxxxi The Warehousing Development and Regulatory Authority can be brought in to link up the cold chains into a network and create conditions where the farmer can obtain Negotiable Warehouse Receipts that can raise funds from the banks, thereby gaining financial flexibility.

0.xxxxii This would need changes in the way APMC legislation works. It is felt that the best way to achieve it would be **remove perishable agricultural produce** from the aegis of the APMC acts. Famers must be given freedom to sell directly to food processing companies, aggregators and retailers in addition to selling in mandis.

0.xxxxiii The cold chain supply system for horticulture and other fresh farm produce should be treated as infrastructure and they should qualify for the corresponding financing and tax incentives.

0.xxxxiv There is a need for simplification of the clearances and licenses required for setting up of cold storages.

0.xxxxv The committee recommends the Public Private Partnership (PPP) model with Viability Gap Funding as an appropriate device to catalyze large scale investments in cold chain. However, the details will have to be worked out. In the interim, investment in cold chains would have to depend on capital grants and some access to a concessional line of finance.

0.xxxxvi The Ministry of Food Processing Industries operates a scheme for capital subsidy of supporting cold chains. This should be a scheme that is on-tap with clearly set out budget limits so that eligible projects within the budgeted limit get the required support. The scheme of subsidy support may be reworked/and sufficient resources provided so that this objective can be achieved.

0.xxxxvii There is a need to promote introduction of newer varieties of vegetables with a longer shelf life.

Chapter-1: INTRODUCTION

1.1 Overview of the Indian Economy

1.1.1 The Eleventh Five Year Plan (2007-12) aimed at achieving a faster and more inclusive growth in order to generate income and employment opportunities needed for improving the living standards of the population, especially the disadvantaged, and to generate resources required for financing social sector programmes. The economy performed well, notwithstanding the crisis of 2008-09 on the global front and the worst drought in 28 years at home in 2009. In the five years of the plan period, the provisional estimates suggest that the economy was able to register an average rate of growth of about 8 per cent.

1.1.2 At the outset of the Twelfth Plan (2012–17), the Indian economy is faced with many challenges, emanating first from the weakness in the global economy and high inflation and slower-than-desired investment growth at home. The Approach Paper for the Twelfth Plan, while projecting two alternative targets for economic growth and chosen to opt for the 9 per cent target path. The sector-wise growth rates consistent with this target are given at **Table-1**.

Table-1: Economic Growth Rates during Recent Plan Periods (per cent p.a.)

Sectors/ Plan Period	Agriculture, forestry & fishing*	Industry	Services	Total GDP
Ninth Plan (1997-2002)	2.5	4.3	7.9	5.5
Tenth Plan (2002-07)	2.3	9.4	9.3	7.8
Eleventh Plan (2007-12)	3.3	6.5	9.6	8.0
Twelfth Plan (2012-17) (Target)	4.0+	9.6	10.0	9.0

*It is likely that on the revision of farm sector GDP growth rates for the previous year and an expected good harvest in 2011-12, the average for the 11th Plan may be higher at 3.3 to 3.5 per cent.
Source: Approach Paper for the 12th Five Year Plan, Planning Commission, Govt of India. Figures for Eleventh Plan have been suitably revised based on Actual/Advance Estimates of CSO.

1.1.3 The farm sector has grown at an average rate of around 3.5 percent during the first four years of the Eleventh Plan. This is a marked improvement from the average growth of about 2 per cent during the Tenth Plan Period. Given that half of our population is wholly or substantively dependent on agriculture & allied activities, we need faster farm sector growth in order to benefit the largest section of the population. Development experience suggests that a one percent increase in farm sector incomes is at least 2 to 3 times more effective in reducing poverty than the same magnitude of growth increase in the non-farm sector. Globally weak farm sector output growth has been traced to higher food prices, although there are other contributory reasons such as the use of farm produce for producing bio-fuels. In India the severe drought of 2009 had a powerful impact on increasing food price inflation, though on the whole output growth has been strong. However, weakness in our food logistics systems have principally aggravated temporary and small shortages into huge price hikes and have played havoc with food prices, especially that of perishables.

1.1.4 Agriculture is a State subject. Therefore, there is need for coherence between the Centre and States in policies and strategies. Overall investment in agriculture, which had dipped to less than 10 per cent of Farm Sector-GDP in 2002-03 has increased substantially and presently stands at more than 20 per cent of the Farm Sector-GDP. Higher levels of investments in agriculture & allied activities, both by the private and public sectors have generated this increase. Higher investment, especially private sector investment responds positively to reforms that are undertaken to streamline the incentive structures for the farmers, especially the institutional framework governing farm sector activities, including the marketing of farm produce.

1.2 Trend of Inflation

1.2.1 The historical trend of annual average inflation is depicted in **Table-2** below:-

Table-2: Historical Trend of Annual Average WPI Inflation
(Broad product-group wise)

Years	Base Year	All Commodities	Primary Articles			Fuel and Power	Manufactured Products	
			All	Food	Non-Food		All	Manufactured Food Products
1971-72 to 1981-82	1970-71	10.2	9.7	8.5	9.0	14.9	9.7	11.8
1982-83 to 1993-94	1981-82	7.9	8.1	9.2	8.2	8.5	7.7	7.9
1994-95 to 2004-05	1993-94	5.9	6.0	5.9	6.2	10.0	4.8	5.3
2005-06 to 2011-12	2004-05	6.6	10.5	9.9	9.2	7.9	4.9	6.1

Source: Handbook of Statistics on Indian Economy, RBI and Office of Economic Adviser, Ministry of Commerce and Industry

1.2.2 It can be seen from **Table-2** that over the decades there has been a drop in the overall level of inflation. It has eased from an average of 10.2 per cent in the seventies to 7.9 per cent in the eighties, and early nineties, to 5.9 per cent in the decade ended 2004-05, which years also experienced subdued economic growth. After 2004-05 as the economy picked up growth momentum, there was a pick-up once again in the level of inflation, driven primarily by increase in the prices of primary food articles, energy and manufactured food products.

1.3 Food Inflation

1.3.1 Inflation in food products are of particular importance in so far as it hits the working people the hardest. Moreover it is eventually passed through into manufactured goods through higher money wages and generally keeps inflation and inflationary expectations at a level that is not conducive for general macroeconomic stability. As is evident from **Table-3**, inflation in primary food products (as also all for manufactured food products) have generally been higher than that of overall inflation and of course for general manufactured goods inflation. This underscores the importance of food price inflation in pushing

overall inflation levels higher than they otherwise may have been. It is also interesting to note that within the broader category of primary food there have been significant variations in the way prices of cereals, pulses, fruit, vegetables, milk and eggs, meat & fish have tended to move. As may be seen from **Table-3**, prices of vegetables, fruits, milk and eggs, meat & fish have been higher than that of cereals and primary food as a whole, with the variance more pronounced in periods where the economy was experiencing either high growth or growth acceleration – such as in the eighties and the period after 2004-05.

Table-3: Historical Trend of Annual Average WPI Inflation Within Primary Food Category

Years	Base Year	Primary Food	Cereals	Pulses	Vegetables	Fruit	Milk	Eggs, Meat & Fish
1971-72 to 1981-82	1970-71	8.5	8.1	13.5	7.6	10.3	7.1	11.0
1982-83 to 1993-94	1981-82	9.2	8.2	10.4	11.8	9.3	9.0	9.4
1994-95 to 2004-05	1993-94	5.9	5.6	5.5	6.6	8.4	5.7	6.4
2005-06 to 2011-12	2004-05	9.9	8.5	11.1	8.9	9.4	10.1	11.8

Source: Office of Economic Adviser, Ministry of Commerce and Industry

1.3.2 While the Indian economy performed better during the Eleventh Plan, high inflationary pressures have been a recurring problem, particularly in primary food products, minerals and fuel items. The average inflation for the Eleventh Plan period as a whole will be about 7.0 per cent, higher than 5.0 per cent in the Tenth Plan and 4.9 per cent in the Ninth Plan. For the Twelfth Plan, inflation estimates have been pegged at 4.5 to 5.5 per cent. With GDP growth targeted at 9.0 per cent, in order to maintain price stability, it is vital that we are able to tackle supply side bottlenecks and expand the productive potential of the economy.

1.3.3 Based on average level of monthly indices for various commodities during the previous few years, inflation in various products is depicted in **Table-4**.

Table-4: Average Inflation of the Last Few Years							
	2005-06	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**
WPI	4.4	6.6	4.7	8.1	3.8	9.6	8.8
Primary Articles *of which*	4.3	9.6	8.3	11.04	12.7	17.8	9.7
Food	5.4	**9.6**	**7.0**	**9.1**	**15.3**	**15.6**	**7.3**
Food grain *of which*	**7.2**	**14.1**	**6.9**	**11.0**	**14.5**	4.9	3.6
Cereals	5.9	**10.1**	9.5	**11.9**	**12.6**	5.3	3.8
Pulses	**13.3**	**31.6**	–2.6	7.5	**22.4**	3.2	2.5
Fruits & Vegetables, *of which*	**8.1**	**3.5**	**11.5**	**8.2**	**9.6**	**16.4**	**6.4**
Fruits	**3.3**	**6.2**	**4.3**	**12.8**	**5.5**	**19.8**	**14.2**
Vegetables	**14.0**	**0.5**	**19.9**	**3.5**	**14.0**	**13.0**	**-2.1**
Egg, Meat & Fish	**6.4**	**6.1**	**3.2**	**7.8**	**20.8**	**25.5**	**12.8**
Milk	**1.0**	**7.9**	**5.2**	**7.6**	**18.8**	**20.1**	**10.3**
Primary Non Food *of which*	–3.3	5.8	11.9	12.9	5.5	22.3	9.6
Raw Cotton	–9.7	7.1	15.7	26.3	–1.9	43.7	13.0
Oil Seeds	–9.6	4.6	19.8	15.9	2.9	4.7	12.3
Minerals	15.2	18.6	11.8	22.1	8.8	24.8	25.5
Fuel and Power	13.5	6.5	0.0	11.6	–2.1	12.3	13.4
Manufactured Products *of which*	2.4	5.7	4.8	6.2	2.2	5.7	7.2
Manufactured Food	1.2	5.3	3.5	8.7	13.5	3.7	7.1
Data source: Office of the Economic Adviser, Ministry of Commerce and Industry. Major areas of concern indicated in the oval and also in bold print							

Area of Concern

1.3.4 It can be seen that inflationary pressures during the last few years have mainly come from primary articles, predominantly food. Within food, while the pressures from foodgrains eased during 2010-11 and 2011-12 due to good output and also official intervention in the grains market. However, other primary food products, namely fruits and vegetables, eggs, meat & fish, and milk saw elevated rates of inflation. There is evidence to believe that a change is occurring in the food consumption basket, reinforced by increase in incomes, away from cereals and towards more nutrition oriented and protein based items such as milk, vegetables and fruit and eggs, meat & fish. Data suggests that output response in horticulture, dairy and other animal husbandry, as well as in fisheries has been quite strong. However, the rise in volumes has been associated with persistence inflationary pressures. While there may be an element of excess demand, it is hard to escape the conclusion that behind the sharp increase in prices is an inadequacy of logistics – from cold chains, to transportation to handling facilities. This is borne out first by the huge oscillations in *mandi* prices at the peak supply and lean supply periods of the season and the observation that at peak supply times the farmer secure very poor remuneration and the gap between what the farmer gets and what the consumer pays there is a yawning chasm.

1.4 Production of Foodgrains in India

1.4.1 Green Revolution technologies in the 1960s increased agricultural yields for many crops across India by introducing high-yielding varieties of seeds, better irrigation facilities and use of chemical fertilizers & pesticides. Government also put in place many agrarian reforms, introduced a framework of

Minimum Support Prices and procurement, as well as extension of irrigation facilities. These initiatives helped in boosting agricultural production to tackle the problem of food shortage faced then by the people of India. As a result, foodgrain production increased from 82 million tonnes in 1960 to nearly 252 million tonnes in 2011-12 – by a factor 3.07 times (**Table-5**). At the same time, the country's population rose from 439 million in 1961 to 1.2 billion, that is, by a factor of 2.77 times.

Table-5: Trend of Foodgrains Production *(Million Tonnes)*

Year	Cereals				Pulses	Total Foodgrains (5+6)
	Rice	Wheat	Coarse Cereals	Total (2 to 4)		
1	2	3	4	5	6	7
1960-61	34.6	11.0	23.7	69.3	12.7	82.0
1970-71	42.2	23.8	30.6	96.6	11.8	108.4
1980-81	53.6	36.3	29.0	118.9	10.6	129.5
1990-91	74.3	55.1	32.7	162.1	14.3	176.4
1999-00	89.7	76.4	30.3	196.4	13.4	209.8
2010-11	96.0	86.9	43.7	226.5	18.2	244.8
2011-12	103.4	90.2	41.9	235.5	17.0	252.5

Note: Data for 2010-11 are based on Final Estimates and for 2011-12, 3rd AE.
Source: Ministry of Agriculture, Government of India.

1.4.2 The increased production of foodgrains has come primarily from improvement in yield and some increase in area, particularly in oilseeds, as may be seen from **Table-6**. The State-wise estimates of area production and yield of cereals and foodgrains are at **Annexure-1 & 2** respectively.

Table-6: Compound Annual Growth Rates of Area, Production and Yield (per cent per annum)

	1980-81 to 1989-90			1990-91 to 1999-2000			2000-01 to 2011-12*		
	Area	Output	Yield	Area	Output	Yield	Area	Output	Yield
Rice	0.41	3.62	3.19	0.68	2.02	1.34	0.04	1.72	1.68
Wheat	0.46	3.57	3.10	1.72	3.57	1.83	1.22	2.37	1.14
Coarse Cereals	–1.34	0.40	1.62	–2.12	–0.02	1.82	–0.75	3.01	4.39
Pulses	–0.09	1.52	1.61	–0.60	0.59	0.93	1.70	3.47	1.91
Total Foodgrains	**–0.23**	**2.85**	**2.74**	**–0.07**	**2.02**	**1.52**	**0.43**	**2.32**	**2.91**
Sugarcane	1.44	2.70	1.24	–0.07	2.73	1.05	1.37	1.96	0.58
Total nine Oilseeds	1.51	5.20	2.43	–0.86	1.63	1.15	2.08	4.45	3.39

*Growth rates based on 2nd AE 2011-12, Department of Agriculture and Co-operation, February 2012
Source: Economic Survey 2011-12, Government of India

1.5 Horticulture Output

1.5.1 India has a wide range of horticultural and floricultural produce, namely fruits, vegetables, tropical tuber crops, ornamental crops, medicinal and aromatic plants, spices, cut flowers, ornamental plants and plantation crops like coconut, tea, coffee, cashew, cocoa, honey and rubber. Government placed major

emphasis on horticulture since the mid-1980s to provide farmers with a means to diversify their activities and make farming more profitable. Increase efficiency and utilization of natural resources, namely land, soil quality, water and the general environment and to create skilled employment for rural people, especially women. The past efforts have been rewarding and India is now the largest producer of coconut, areca nut, cashew, ginger, turmeric, black pepper and the second largest producer of fruits, vegetables and tea. Among new crops are kiwi, olive, gherkins, kinnow and oil palm which have all been successfully introduced for commercial cultivation in the country.

Table 7: Production of Select Horticultural/Floriculture Produce ('000 metric tonnes)

	1991-92	**2001-02**	**2004-05**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12e**
Fruits	28,632	43,001	50,867	65,587	68,465	71,516	74,878	77,525
Vegetables	58,532	88,622	101,246	128,449	129,078	134,104	146,554	149,607
Aromatic/ Medicinal	na	na	159	396	430	573	605	657
Flowers, loose	na	535	659	868	987	1,021	1,031	1,031
Nuts	na	114	121	177	173	193	*Incl. in fruit*	
Plantation crops	7,498	9,697	9,835	11,300	11,336	11,947	12,007	12,993
Mushroom	na	40	35	37	37	40	n/a	n/a
Honey	na	10	10	65	65	65	n/a	n/a
Spices	1,900	3,765	4,001	4,357	4,145	4,016	5,350	5,726
Grand Total	**96,562**	**145,785**	**166,939**	**211,235**	**214,716**	**223,474**	**240,426**	**247,540**

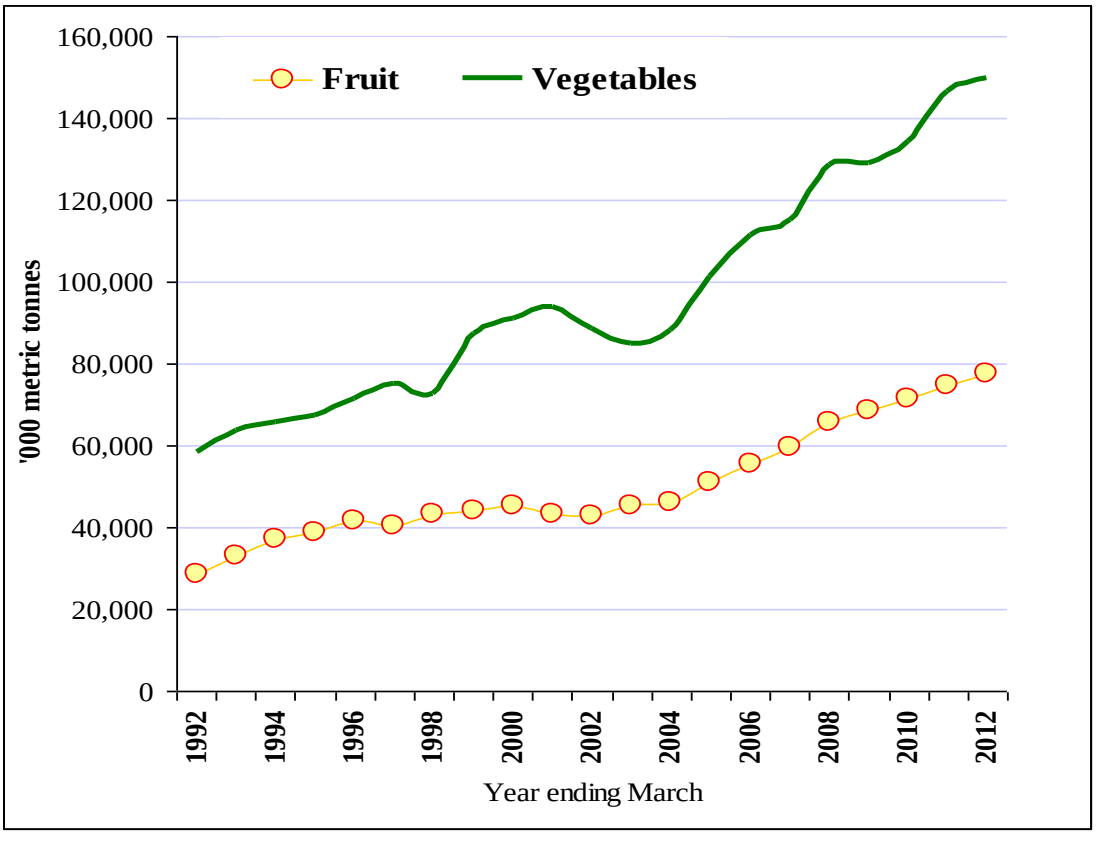
Source: Horticultural Division, Ministry of Agriculture. Figures for 2011-12 are estimates

1.5.2 We produce 17 per cent of the global total of vegetables and 14 per cent in the case of fruits. India is the second largest producer of mango, banana, papaya, *sapota*, pomegranate and *aonla*. About 40 per cent of the world's mangoes and 30 per cent of the world's bananas and papayas are produced in India. In terms of productivity of grapes, India ranks first in the world. While production of horticultural crops has been increasing since Independence, tremendous growth in area, production and productivity has been in evidence ever since the Eighth Plan (1992–97). Fruits and vegetables together constitute about 92 per cent of the total horticultural production in the country.

1.5.3 It may be seen that from **Table-7** that production of major horticultural items rose from 96.6 million tonnes in 1991-92 to 247.5 million tonnes in 2011-12, i.e. by a factor of 2.56 times. Of this, vegetable output is 2.56 times higher, while that of fruit production is 2.71 times. The counterpart factor for population was 1.42 times. Productivity of fruits has gone up from 10.0 mt /Ha in 1991-92 to 11.8 mt /Ha in 2011-12 while yield of vegetables is estimated to have increased from 10.5 mt /Ha to 17.4 mt /Ha in the corresponding period. The details of Area and Production horticulture crops over the last few years are placed at **Annexure-3.** The fairly sharp and sustained climb in the output of vegetables and fruit over the past two decades is clear from a perusal of **Chart-1**.

Chart-1

Production of Vegetables and Fruit over the past two decades



1.5.4 The average annual growth rates of production of fruits, vegetables, plantation crops and total horticultural products during various time segments of the past two decades are presented at **Table-8**. It can be seen that while there was a moderation in output growth in some years in the early part of the previous decade, there has been a fairly good recovery in the more recent period. This is also clear from **Chart-1** – though the recovery in the output growth of fruit has been somewhat slower than for vegetables.

Table-8: Average Annual Rates of Growth in Output of Major Horticultural Products

Per cent per annum	**1991-92 to 1998-99**	**1999-2000 to 2004-05**	**2005-06 to 2011-12**
Fruits	5.1	2.5	6.2
Vegetables	5.6	2.7	5.8
Plantation Crops	5.0	–0.2	4.2
Spices	5.4	6.1	6.0
Total of above	5.3	2.3	5.8

1.5.5 Point to point measures of change and even average of annual growth rates suffer a weakness stemming from wide year-on-year fluctuations in output levels, a characteristic that is central to agricultural products. Alternatively, aside from using three-year moving averages, it is useful to see what the trend rates of growth per annum are. The trend rate of growth for fruit & vegetables both show acceleration, from the

nineties to the most recent period (2004-2012). In the case of fruit the numbers are 5.2 per cent for the nineties and 6.7 per cent for the period 2004–12. For vegetables, the counterpart numbers are 5.2 and 6.4 per cent. The observed dip in output growth in the early years of the previous decade may have been weather related.

1.5.6 The State-wise details on Area, Production and Productivity of fruits since 1991-92 are placed at **Annexure-4**. It may be seen that most of States including North Eastern (N-E) States have experienced an increase in both area and production of fruits during 2009-10 compared to 1991-92. Of the major fruit producing States, Andhra Pradesh accounts for 17 per cent of total fruit production, followed by Maharashtra (14 per cent), Gujarat (10 per cent), Tamil Nadu (9 per cent), Karnataka and Uttar Pradesh (8 per cent each), Bihar (5 per cent), MP and West Bengal (4 per cent each).

1.5.7 The State-wise details on Area, Production and Productivity of vegetables since 1991-92 are placed at **Annexure-5**. As in the case of fruits, most of the States including N-E States have increased their area under vegetable during 2009-10 compared to 1991-92. However, Tamil Nadu, Odisha, Bihar, Kerala and J & K have witnessed decline in vegetable cropped area. North Eastern States have shown tremendous expansion in respect of area for vegetables. Productivity has also been increasing across the States. Of the major vegetable producing States, Uttar Pradesh shares 17 per cent of total vegetable production followed by West Bengal (16 per cent), Bihar (10 per cent), Odisha (7 per cent), Tamil Nadu (6 per cent), Gujarat, Karnataka and Maharashtra (5 per cent each), Madhya Pradesh (4 per cent) and Assam (3 per cent). The All-India productivity for select horticultural items is given at **Annexure-6**.

1.6 Present System of Supply Chain Network – Foodgrains

1.6.1 Storage capacity available with Government agencies both at the Central and the State levels for foodgrains to service the Public Distribution System (PDS) and other Government welfare schemes. As on 30 November 2011, the total covered storage capacity available with Food Corporation of India (FCI) and State Governments was about 45.3 million tonnes (m.t.), of which covered capacity with FCI was 29.9 m.t. and that with State agencies was 15.4 m.t.. Total All-India storage capacity of Central Pool stocks was 62.5 million tonnes (as on 30 Nov 2011), of which 17.20 m.t. was in form of Cover and Plinth (CAP), that is construction-wise uncovered but with a raised platform and some manner of temporary cover (**Table-9**). The state-wise break-up of storage capacity is given in **Annexure-7**.

Table-9: Storage Capacity for Central Pool Stocks as on 30 Nov 2011 (million tonnes)

FCI			**State Agencies**			**Grand Total**		
Covered	**CAP**	**Total**	**Covered**	**CAP**	**Total**	**Covered**	**CAP**	**Total**
29.93	3.42	33.35	15.35	13.78	29.13	45.28	17.20	62.48

1.6.2 The storage capacity available with FCI is concentrated in the Northern Zone. The zone-wise distribution of the foodgrain storage capacity with FCI is as below:

- Northern Zone 56 per cent
- Southern Zone 22 per cent

- Western Zone 13 per cent
- Eastern Zone 8 per cent

1.6.3 About 67 per cent of the storage capacity is concentrated in the six major procuring states namely, Punjab, Haryana, Uttar Pradesh, Andhra Pradesh, Rajasthan and Uttarakhand. Several States have emerged in recent years as important states for foodgrain procurement, namely, Bihar, Odisha, Jharkhand, West Bengal, Madhya Pradesh and Chhattisgarh presently account for 13 per cent of the current storage capacity. Storage has historically been concentrated in the producing / procuring areas. Some states have storage capacities of less than one month of requirement, namely, Jharkhand and Himachal Pradesh, while some other States including North Eastern States have got capacities of less than 2 months of requirement.

1.6.4 As per estimates of the Eleventh Plan Working Group on Agricultural Marketing Infrastructure set up by the Planning Commission, of total agricultural production, about 60 per cent is retained and stored by the farmers for consumption and use as seed, feed and payment of wages to labourers. About 40 per cent constitutes the marketable surplus which is handled by traders, co-operatives and government agencies. With the advent of improved agricultural technology, the farmer can afford to store the grain for longer periods. At the rural level, grains are stored mostly from three months to two years. However, due to antiquated ways of storing food grains (such as use of gunny bags, mud bins, baked earthen containers, etc.), about 5–10 percent losses have been estimated to occur during the storage period of 3 to 8 months, especially in the rainy season.

1.6.5 The National Policy on Handling, Storage and Transportation of Foodgrains (2000) aimed to harness efforts and resources of public and private sectors, both domestic and foreign, to build, operate infrastructure for bulk handling, storage and transportation of foodgrains in the country. Under the National Storage Policy, the bulk grain handling facilities are now being created on the BOO basis at identified locations in the country. Accordingly, the Department of Food and Public Distribution and Food Corporation of India (FCI) have taken the responsibility for creation of storage and bulk handling on a BOO basis for meeting storage requirements. Private entrepreneurs are also provided with guaranteed storage utilization by FCI.

1.6.6 The years 2007-08 to 2009-10 witnessed much greater levels of procurement of foodgrains by the Government agencies. This caused strain in available capacities for storage of foodgrains compounded by the limited availability of train movement capacity. In the marketing year 2010-11, procurement of wheat and rice is expected to touch 60 million tonnes, which is an all-time high. The Central Pool stocks also stood at all-time high levels of around 65.4 million tonnes as on 1 June 2011. Maintenance of adequate food reserves is critical for ensuring food security, particularly as the Government has introduced the National Food Security Bill in December 2011. Accordingly, there is a need to build adequate storage capacity to meet the future requirements once the Bill is enacted.

1.6.7 Keeping this in view, Government has already formulated a scheme for construction of storage godowns by private entrepreneurs in conjunction with Central Warehousing Corporation and State Warehousing Corporations to tackle the situation arising out of increase in procurement. The aim is to

reduce the dependence on CAP (open) storage by construction of covered godowns both in procurement and consumption areas through the private entrepreneurs. Assessment of additional storage needs is based on the overall procurement/ consumption and storage space already available. For the consuming areas, storage capacity is to be created to meet four month's requirement of PDS and other welfare schemes in a state. For the procurement areas, the highest stock levels in the last three years are considered to decide the storage capacity required. The increase in storage capacity in recent years did not keep pace with the increase in procurement levels. Certain states have been witnessing acute shortage of storage space which has also resulted in a small part of foodgrains becoming unfit for consumption.

1.6.8 Keeping in view the storage requirements across the country assessed based on Government of India guidelines, the High Level Committee (HLC) of FCI has sanctioned 15.3 million tonnes of storage capacity in various states. In addition, Planning Commission has set up a working group to develop a model for construction of modern silos and to assess the capacity requirements in terms of silos. It is envisaged that around 2 million tonnes storage capacity may be set up in form of silos. The report of the consultants has been received and the Empowered Group of Ministers has since approved constructing 2 million tonnes of storage capacity in form of silos. It is expected that after the ongoing initiatives of setting up additional storage capacity of 17 million tonnes, the storage requirement of foodgrains would be adequately met during the Twelfth Plan period.

1.7 Present System of Supply Chain Network – Horticultural Products

1.7.1 The growth of the cold storage industry in India from the year 1955 to 2012 is placed at **Table-10**. The distribution of cold storages in different regions of India has not been uniform as is evident from **Table-11** which shows region wise break- up of numbers and capacities of cold storages in different regions based on data available for the year 2011.

Table-10: Growth of Cold Storage Industry in India

Year	No. of Cold Storages	Installed Capacity ('000 m.t.)
1955	83	43
1960	359	305
1965	600	682
1970	1,218	1,638
1975	1,615	1,994
1979	2,266	3,348
1986	2,607	5,402
2004	4,748	19,552
2007	5,316	23,334
2009	5,381	24,450*
2010	5,837	26,903@
2011	6,156	28,681@
2012$	6,284	29,305@

* Directorate of Marketing and Inspection; @ Includes NHB and NHM assisted cold storages during 2009-10 & 2010-11; $ As on 9 February 2012
Source: Department of Agriculture and Co-operation, Government of India

1.7.2 Regionally, the existing cold storage capacity is concentrated both in terms of number and capacity in the northern region. This may be seen from **Table-11**.

Table-11: Region wise Number and Capacity of Cold Storages in India (2011)						
	Central	**East / NE**	**North**	**South**	**West**	**All India**
Number	430 *(7.0%)*	975 *(15.8%)*	2,895 *(47.0%)*	866 *(14.1%)*	990 *(16.1%)*	6,156 *(100.0%)*
Capacity ('000 m.t.)	1,717 *(6.0%)*	7,817 *(27.3%)*	14,950 *(52.1%)*	1,946 *(6.8%)*	2,251 *(7.9%)*	28,681 *(100.0%)*
Note: Figures in bracket indicate percentage share of all-India *Source*: Department of Agriculture and Cooperation, Government of India						

1.7.3 Of the 28.68 m.t. (million tonnes) of cold storage capacity, nearly 14 m.t. were created between 2000 and 2011, assisted to a significant extent by interventions from National Horticultural Board (NHB), National Horticultural Mission (NHM), Horticulture Mission in North East and Himalayan States, Agricultural and Processed Food Products Export Development Authority (APEDA), Ministry of Food Processing Industries and Department of Animal Husbandry & Fisheries.

Prevalence of potato in existing cold storages

1.7.4 State-wise and region-wise distribution of cold storages as on 31 March 2011 is at **Annexure-8**. It may be seen that Uttar Pradesh has the highest number of cold storages (1,988 out of the total of 6,156) and that these cold storages are mostly designed for and used for storage of potato. West Bengal ranks second (484 cold storages) under this category, again with a predominance of potato. Other important potato stocking states are Punjab, Bihar, Gujarat and Madhya Pradesh. Most of the multi-purpose cold stores are also used for potato storage.

1.7.5 However, there are some that provide storages for **chillies, dry fruits, spices, vegetables** etc. Cold storages for meat, fish, milk and milk products and for other commodities such as chillies and other spices **account for only 1 percent of the total cold storage capacity**. These cold storages are also usually smaller in capacity. Much of this multi-purpose cold storage capacity is located in the states of Karnataka, Maharashtra, West Bengal, Tamil Nadu and in the National Capital Region (NCR).

1.7.6 Commodity-wise and institution-wise (Public, Private & the Co-operative sectors) distribution of cold storage capacity ownership as on 31 December 2009 is given in **Table-12**. It can be seen that nearly 96 per cent of cold storages are in the private sector and about 75 per cent capacity of cold storages is used to store only potatoes while another 23 per cent fall under the multi-product category.

Table-12: Commodity-wise and Institutional Break-up of Cold Storages (as on 31 Dec. 2009)				
	Commodity	**Capacity ('000 Te)**	**% of Total**	**No. of Cold Storages**
1.	Potatoes	18,426.3	75.4	2,862
2.	Multi-purpose	5,644.3	23.1	1,584
3.	Fruits & Vegetables	96.4	0.4	160
4.	Meat and Fish	188.5	0.8	497
5.	Milk/ Milk products	68.2	0.3	191
6.	Others	26.5	0.1	87
	Total	**24,450.7**		**5,381**
	Institutional Sectors			
1	Private	23,406.7	95.7	4,885
2	Cooperative	936.9	3.8	356
3	Public	107.0	0.4	140
	Total	**24,450.7**		**5,381**
Source: Ministry of Agriculture, Government of India				

1.7.7 **The Product**

India produces a wide variety of fruits & vegetables, with different inherent characteristics, across very diverse agro-climatic regions. As such, one type of supply chain will not effectively serve them all.

Broadly, fruits & vegetables can be classified into three segments, based on how their shelf-life varies under ambient or controlled climate conditions.

Segment A: Long shelf life under controlled conditions

Products such as potato, apple and chillies can be stored for as many as six to eight months in cold stores, and can thereafter be simply transported in regular trucks under ambient conditions. Onions and oranges are somewhat similar, and can also be classified under this segment, although the nature of the stores required are different, and their shelf-life is also a few months shorter.

Large part of the production of these fruits & vegetables is restricted to just one season in a year; as a result, the price increases, barring an odd year, are more than the cost of carry through the storage period. Consequently, setting up cold stores is a financially viable proposition for these products, and a significant part of the private sector investments have gone into this segment. That substantial part of the production of these fruits & vegetables is restricted to a few regions in the country, also helps the financial viability through geographic arbitrage.

The financial incentives currently available via NHM, NHB, MoFPI etc. have further accelerated capacity creation in the recent past. An important task now is to modernise the cold storages in this segment, to make them more energy & labour efficient, as well as more flexible through multi-chamber facility creation for better capacity utilisation.

Considering that this approach for segmentation is literally adding apples and oranges, there are important nuances one must be aware of. Early crop varieties of potato, Pukhraj for example, do not go into cold

store as its skin is not suitable for long storage. The price of this early crop fluctuates depending on the overall availability of potato within that time window rather than the cold stores capacity.

Also, while investments are being made along the whole chain for high-priced products within this segment (eg. apples) to explore if quality retention can be better, experiments are being conducted in low-cost modified heap storages at farm level for low-priced products (eg. potato).

Segment B: Moderate shelf life under controlled conditions

The shelf-life of several other products like grapes and pomegranates can be increased to as many as eight to ten weeks using an end-to-end cold chain. This will mean farm level pre-cooling and transportation in reefer trucks besides the cold stores. One can also include products like bananas and tomatoes in this segment, which respond to specific shelf life enhancement processes (eg. controlled ripening).

Once again, there are nuances within this segment too, based on seasonality, prices or production regions. Tomatoes, for example, are available almost throughout the year in Maharashtra, Andhra Pradesh and Tamil Nadu, while they are available for only four months in most of the other producing states. The average price in September 2009 was Rs 4/kg in Bengaluru, while it was Rs 29/kg in Gangtok at the same time. Earlier in February, in the same year, in Bengaluru itself it was Rs 2/kg and went up to Rs13/kg by December 2009. The shelf life of tomato is just four days, when harvested at semi ripened stage and kept at ambient temperature in the supply chain; but, if harvested in mature green stage, kept in cold store at 10-13^0 C, and transported in cold chain, the same can be extended to as many as three weeks!

Although the value loss is quite high in many of the fruits & vegetables in this segment due to quality deterioration and wastages, this segment is not able to attract the required scale of investments in cold chains, due to lack of financial viability barring a few export oriented chains. Needless to say, there is an urgent need for innovation in the structure of financial incentives to attract investments into this segment.

Segment C: Limited shelf life even under controlled conditions

Other fruits & vegetables whose self-life is minimally impacted by cold chains, or those that do not require cold stores at all can be included in this segment (eg papaya, melons, gourds, cabbage, cauliflower, leafy vegetables). While it is true that the self-life of some of these vegetables can be enhanced by a few days, when they are put through a cold chain, it is a more cost-effective solution to stagger the production of such vegetables aligned to the demand than the expensive cold chains.

Unfortunately, the financial incentive systems in India are more capital investment friendly, as opposed to how they could catalyse innovations that may be more revenue expense intensive but do not involve much capital expenditure. As a result, this segment has barely attracted any investments, barring sporadic experiments. In any case, APMC regulations - still applicable in many states - do not allow transactions outside the mandi system, limiting the ability of farmers and the agri-businesses to forge partnerships that enable such coordination along the supply chain.

A quick estimate suggests that the 230 mn MT of fruits & vegetables produced in India are distributed almost equally in each of these three segments.

1.7.8 The Market

A large majority of the fruits and vegetables in the country are currently marketed through the ***"open market transactions system"*** under the conventional APMC regulations. Market yards set up under the APMC Acts are playing a vital role in terms of price discovery, as well as product aggregation & disaggregation along the chain. However, the way these markets are currently organised, there are serious inefficiencies resulting in the consumers paying higher prices while the farmers get an unfairly low share of those prices. With some reforms, the effectiveness of the market yards can be significantly improved, yet they cannot deliver complete solution to the problem at hand, as the transactions will still be based on day's prices only. Market yard processes cannot be geared to coordinate along the whole chain, so necessary for several fruits & vegetables as per the dynamics described in the product section above.

Accordingly, there is a need to develop ***"privately coordinated supply chains"*** to supplement the open markets to take care of those dynamics. Such chains can be vertically integrated by a variety of anchor players, such as the Producers Organisations, the Branded & Packaged Foods Companies, Food Processors, Large Wholesalers and Retailers, Exporters etc. Mechanisms like *Direct Marketing* and *Contract Farming* can be used in different contexts as appropriate. *Modern Terminal Markets*, with Anchor Buyers at the front-end and crop management programmes with the Farmers at the back-end can play a similar role.
Thus, any supply chain solution in the horticulture sector needs to be designed to suit the context of three product segments and two marketing systems.

1.8 Dairy Sector

1.8.1 In 2004-05, milk production in the country was 92.5 m.t. (million tonnes) or 253.4 million litres per day (MLPD). This has since increased by 31 per cent to 121.8 m.t. or 333.7 MLPD in 2010-11, that is by a compounded annual rate of 4.7 per cent. State-wise production of milk in the years between 2006-07 and 2010-11 are placed at **Annexure-9**.

1.8.2 It is expected that milk output will grow to 155 m.t. or 425 MLPD by the end of the Twelfth Plan (2016-17) and then again to 210 m.t. or 575 MLPD by 2021-22. This would result in a significant increase in per capita daily availability from 281 grams in 2010-11 to 325 grams in 2016-17 and 415 grams in 2021-22. This may be compared to the per capita daily availability of milk of 233 grams in 2004-05 and 178 grams in 1991-92.

1.8.3 Milk is perishable in nature. Its quality can be preserved and the shelf life extended by chilling. When milk is extracted, it is at around 37°C. If milk continues to remain at room temperature, bacterial growth affects the quality by production of lactic acid leading to increase in acidity and consequently souring of milk. Rapidly cooling milk immediately after extraction to a temperature of around 4°C and maintaining at that level minimizes growth of micro-organisms thus ensuring increased shelf life. Thus, cooling after extraction and storing and transporting to dairy processing plants is required in refrigerated containers. The cold chain for dairy sector is established with installation of bulk milk coolers at village level, bulk milk chillers at intermediate locations on the route to the dairy plant and chilling plants in dairy processing plants.

1.8.4 It is estimated that of the current level output (2011-12) of 348 MLPD, the quantum that is handled by the organized sector – co-operatives and private sector – is around 46 MLPD, that is, about 13 per cent. Of this 46 MLPD about half is accounted for by the co-operative and private sector each. The total chilling capacity presently available is only 12.9 MLPD. To a considerable extent recourse is taken to using ad hoc cooling solutions – mostly ice packs.

1.8.5 It is expected that by 2016-17, 95 to 100 MLPD will be handled by the organized sector, split about equally between the co-operative and private sector. If the entirety of this daily volume is to be chilled – the desirable solution – the extent of chilling capacity that is need to be available by 2016-17 would be 120 MLPD, assuming 80 per cent capacity utilization. That would mean increasing the chilling capacity in the co-operative sector to 60 MLPD by 2016-17.

1.9 Limitations in the present institutional set-up for Horticulture

1.9.1 As has been stated earlier, India accounts for about 17 and 14 per cent respectively of global vegetable and fruit output. Presently all horticulture crops combined cover approximately 8 per cent of the cropped area of the country. The present marketing system of agricultural produce in the country, particularly for fruits and vegetables is for the most part pre-modern. At the point of peak production in these seasonal crops, producers sometimes fail to even realize their cash expenses of transportation to markets, leave alone the cost of production and capital investment. Fruit and vegetable growers generally receive only a small part of the final price paid by the consumers. The largest part of the mark-up is lost in the marketing chain through inefficiencies and wastage or accrues to the many intermediaries. The profit of these intermediaries is in general disproportionately larger compared to the services rendered by them. There is considerable loss and wastages due to inefficient handling, transportation and storage methods. The report of the *Task force on Development of Cold Chain in India,* set up by the Ministry of Agriculture (August 2008); Planning Commission (*Eleventh Plan Working Group on Horticulture*) and *All India Co-ordinated Research Project on Post Harvest Losses* (CIPHET, Ludhiana, April 2010), the post-harvest losses continue to be in the range of 18 to 40 per cent for several commodities. Therefore the establishment of a robust cold chain, transport and logistics infrastructure is necessary to meet the combination of rising output produced by our farmers in response to the growing demand and change in consumption habits of our people in favour of horticultural, animal husbandry and fishery produce.

1.9.2 The sharp increase in inflation in the recent period has been predominantly driven by the rise in the food prices. While part of it may be on account of demand supply mismatch, a major reason has been the inefficiencies in the supply chain management and the processes involved in bringing the farm produce from farm to the consumer. As stated earlier, though India is the second largest producer of fruits and vegetables (about 200 m.t. p.a.), it has a very limited integrated cold-chain infrastructure, with only 6,156 standalone cold storages, having a total capacity of 28.68 million MT, most of which is used only for potatoes. The chain is highly fragmented and hence, perishable horticultural commodities find it difficult to link to distant markets, including overseas markets, round the year. Besides, wastages are high due to improper handling and storage, pest infestation, poor logistics, inadequate storage and lack of

transportation infrastructure. Only a small quantity of agriculture production is processed for value addition.

1.9.3 Accordingly, to extend the shelf life of fruits & vegetables, cold storages and a cold chain system is essential. Cold storage has been largely adopted for long term storage of potato, orange, apple, etc. The cold chain concept is also employed for high value crops like grapes, pomegranates, flowers, as also for seasonal and perishable commodities like potatoes and other vegetables/ fruits. The provision of adequate storage, under scientifically controlled conditions, is the only mechanism which can ensure that a crop harvested over a period of one or two months is capable of serving the round the year market demand. The role of cold storages/storages in cutting down of losses due to spoilage, avoiding gluts and distress sale by growers, reducing transport bottlenecks at the peak period of production, and maintenance of quality of the produce are of vital importance.

1.9.4 The role of time and volume is brought out well in the potato business. The production of potato is concentrated between December and March. The consumption needs and seed requirements for rest of the year have to be met out of the stocks. This can and sometimes leads to a situation which is characterized by:

- Crashing of prices during the peak season; this forces growers, particularly small & marginal farmers, to dispose output at a price which sometimes may not cover the cost of production;
- There is a wide price disparity between peak and lean period arrivals sometimes ranging up to 100 to 150 per cent;
- Undesirable extent of control of the market by such traders and agents who command large cold storage capacity that is spread over different states and who are thus able to regulate the flow of supply to different markets; and
- The erratic price and arrival pattern sometimes lead to discouragement of farmers from cultivation. The lack of adequate cold storage capacity compounds this problem.

In this background, the only solution is to encourage major cold storage capacity expansion and introduce more players into the market to foster competition.

1.9.5 The typical farm produce supply chain is an outcome of the both the construction of the Agriculture Produce Marketing (APMC) Act and the manner in which it works. In almost all cases the supply chain involves a large number of intermediaries between farmer and consumer, namely a sequence of aggregators and commission agents, traders – at the wholesale level and finally the retailer. At each stage there is a price mark-up, as also time delays due to activities such as packing, transport, loading/unloading, market charges, etc. Under the APMC acts, market yards (*mandis*) have been established at different places within the states. The wholesales and retail trade or manufacturing companies are prohibited from buying the farm output from any place, other than the *mandi*. Similarly, farmers have no choice but to sell their produce through the auction at the *mandi*. In many *mandis*, no auction takes place. Such barriers not only hamper smooth flow of farm product but also add to the overall cost of supply at the retail level.

1.9.6 It is generally believed that licencees and commission agents have formed informal cartels in most *mandis.* These intermediaries thus dominate the value chain and it is reported that even *mandi* norms are often flouted and taken advantage of in order to make pricing lacks non-transparent. A study by the World Bank reported in 2007, brings out the inefficiencies and cost escalation on various counts. The study[1] shows that there is a wide difference between the average farm gate price and the price at the wholesale and retail level. It is generally believed that on an average basis the farmer is able to receive one-quarter to one-third of the final retail prices, varying from crop to crop, location to location and the point in the season. However, there is enough evidence to suggest that when prices slump at peak season or at times when retail prices spike, the farm gate receipts can fall to 10 to 15 per cent and even less.

1.9.7 It has been repeatedly observed that there is a wide disparity in the prices of horticulture products across markets in the country. For instance on the basis of available data, the mandi prices for brinjal averaged Rs 1,187 per quintal in December 2010. However, prices aggregated by States ranged between Rs 342 (Uttarakhand) to 3,554 (Tamil Nadu) per quintal and the coefficient of variation was 62 per cent. It may be recollected that in the winter of 2010-11 there was a most unusual runaway price increase in vegetables which began with onion but rapidly spread to tomato, brinjals and other items. However, even in December 2009 where seasonal price behaviour was normal, while the average price was Rs 541 per quintal, the range was between Rs 242 (Madhya Pradesh) and 2,223 (Tamil Nadu) and the coefficient of variation was 62 per cent.

1.9.8 It should be pointed out that the data is already smoothed out by averaging across all markets in a given State and for all of the days in the month. The dispersion across *mandis* on any given day would be higher still. In the current year, data for the month of February 2012 shows that for brinjal as against the average price of Rs 1,139 per quintal, the range was Rs 295 (Uttarakhand) to Rs 1,608 (Kerala) and the coefficient of variation was 29 per cent, somewhat lower than that in December 2010 or for that matter January 2012 (43 per cent). The very wide disparity in prices appears to be a normal characteristic of the vegetable and fruit market.

1.9.9 In January 2010, the Development Policy (DP) Division in the Planning Commission collected some primary data from the Azadpur *mandi* in Delhi and the Panipat *mandi* to find out what the farmer/aggregators were receiving at the *mandi*, the price recorded by the APMC, the wholesale price and the retail price both in Delhi and Panipat. Expectedly there were significant variations on account of quality. However, what emerged was that for fresh vegetables that are produced in the region around Delhi, the price received by the seller at the Panipat *mandi* varied from 27 to 50 per cent (median 40 per cent) of the retail price in Panipat and 20 to 40 per cent (median 25 per cent) of the retail price in Delhi. However, it must be noted that the seller at the *mandi* is a primary or perhaps a secondary aggregator and the price that is received at that point has to be adjusted downward for their costs, margins and wastage in order to arrive at the final farm gate price.

[1] *From Competition at Home to Competing Abroad: A Case Study of India's Horticulture*, Aaditya Mattoo, Deepak Mishra and Asish Narain, The World Bank and Oxford University Press, 2007. The study covered supply chain analysis of thirteen high value horticultural products from farm to retail and involved primary surveys that covered 1,400 farmers, 200 commission agents and 65 exporters across sixteen major Indian States

1.9.10 The recent episode of very high inflation in vegetables and fruits during the winter of 2010-11 exposed serious flaws in our supply chains. The Finance Minister in his budget speech of 2011-12 indicated that Agriculture Produce Marketing Acts need to be reviewed and enforced by the State Governments. In his Budget speech of 2012-13 he has announced a new centrally sponsored scheme titled "National Mission on Food Processing".

1.9.11 Improving marketing conditions and encouraging private sector participation require reforming the APMC legislation. These steps are particularly relevant for the high-value, perishable segment that is currently hostage to high post-harvest losses and weak farm–consumer linkages. The APMC legislation was started as a protective regime to prevent exploitation of farmers in marketing their produce and ensuring fair prices. It has however had unintended consequences, including depriving farmers of a more remunerative price, adding to the consumer price and creation of a non-transparent market structure with large physical wastage, inadequate infrastructure in handling and storage. Cleaning up these archaic provisions can trigger private sector investment in developing regularized markets, logistics and warehouse receipt systems, futures markets, and in infrastructure (such as cold storage, grades and standards, and quality certification) for large domestic markets as well as imports and exports. While several States have amended the Acts to allow private markets to be set up in competition with the existing mandis, many States are yet to follow suit.

1.9.12 Agricultural expansion and diversification pose special challenges in marketing because the high-value horticultural produce is more perishable than foodgrains. Farmers need assured linkages to efficient markets with transparent pricing and also modern logistics and cold chains to ensure transportation with minimum spoilage. Modern markets, whether established by the private sector or by co-operatives, can improve marketing facilities by offering grading opportunities and cold storage facilities as well as more transparent price discovery through open auction. Contract farming, which is being encouraged by many States, also provides a mechanism for improving linkages between farmers and markets through the active involvement of the private sector, which can also serve as a supplier of key inputs and extension advice. An important issue in this context is the need to ensure that small and marginal farmers have adequate bargaining strength. An adequate dispute resolution mechanism is also necessary to encourage formation of farmers' groups (producer companies, co-operatives, self-help groups) not only for contract farming but also to avail of other economies of scale. Ways of creating appropriate incentives formation form the agenda for agricultural policy in the Twelfth Plan.

1.9.13 Contrary to the popular belief, cold chain is not merely refrigeration of perishable commodities. Cold chain is a logistics system that provides a series of facilities to maintain ideal storage conditions for perishables from the point of origin to the point of consumption in the food supply chain. The chain needs to start at the farm level – post-harvest, pre-cooling, etc. – and reaches to the consumer or at least to the retail outlets. A well organized and efficient cold chain reduces spoilage, retains the quality of the harvested products and guarantees a cost efficient delivery to the consumer. A significant aspect of the system is that if any of the links is missing or weak, the whole system might fail.

1.9.14 The Warehousing (Development and Regulation) Act 2007 had been made effective from 25 October 2010, paving the way for development/regulation of warehouses and promotion of negotiability of warehouse receipts. The Warehousing Development and Regulatory Authority was established under the provisions of the Act. The Negotiable Warehouse Receipt (NWR) system was formally launched in April 2011. This would help farmers to seek loans from banks against NWRs to avoid distress sale of agricultural produce. It will also be beneficial for a number of other stake-holders such as banks, financial Institutions, insurance companies, trade, commodities exchanges as well as consumers. While the focus is predominantly on commodities stored in general warehouses, gradually the concept of accreditation of cold storages and NWRs issued by cold storages need to catch up momentum. This can help farmers act as price negotiators rather than price takers with the help of cold storage receipts.

1.9.15 Technology will have a major role to manage the critical gaps in demand and supply of cold storage. Use of Global positioning system (GPS), better electronic weighing systems, local language billing machines and General Packet Radio Services (GPRS) for updating the details on the central server are some of the key innovations being used for preventing corruption and better availability to villagers. Innovations like these must become part of the cold chain network.

1.10 Major Recommendations of Previous Committees

A number of committees have deliberated on these and related issues over the past few years. These are listed below in order of chronology, with the most recent at the top.

1.10.1 Committee of State Agriculture Marketing Ministers

To expedite the process of reforms in agricultural marketing, Ministry of Agriculture, Government of India had set up a Committee of State Ministers in charge of agricultural marketing under the Chairmanship of Minister of Marketing and Co-operation, Government of Maharashtra. The Committee has submitted its first report in September 2011 and the major recommendations are:

- States to amend the APMC Act on the line of Model Act and notify the Rules at an early date;
- Provide Choice of Multiple and Competitive Market Channels to farmers;
- Independent Regulatory Authority needed to encourage the private investors. To begin with, regulator to be from Government who should not draw salary from Mandi Board;
- Simple and smooth license/registration of traders in Mandi – Provide Membership to Electronic Spot Exchange e.g. NSEL;
- Need for Viability Gap Funding to attract private sector investment;
- Agricultural Markets may be treated as infrastructure project so as to invite economic source of funding of FDI/ECB in addition to other Tax exemptions / facilities;
- Member States should waive market fee on fruits & vegetables. However, Government of India must reimburse the loss to APMC;
- Investment in marketing infrastructure under RKVY be increased to minimum 10 to 15 per cent of State RKVY spending;
- Market fee/cess should be maximum 2 per cent of the value and Commission Charges should not exceed 2 per cent for food grains / oilseeds and 4 per cent for Fruit and Vegetables;

- Independent (of APMC) district level authority may be set up for registration and dispute settlement in contract farming and no market fee should be levied;
- Member States should take initiatives to remove physical barriers like check gates etc. for smooth movement of agricultural produce;
- There should be single window unified single registration for traders/ market functionaries across the States with validity period not less than 5 years;

1.10.2 The Working Group on Consumer Affairs

The Working Group on Consumer Affairs set up by the Government under the chairmanship of Gujarat Chief Minister Shri Narendra Modi, has made the following recommendations specifically pertaining to the supply chain:

- *To increase competition in agriculture produce markets*: Since the APMCs dominate markets, establishment of private and other agriculture markets should be encouraged to stimulate competition and for better price discovery. This will multiply the number of distribution channels and help farmers realize better price for their produce. Accordingly, all States should amend their APMC Acts to provide for private/co-operative markets, allow direct marketing, rationalize market fee and attract agencies to take up marketing infrastructure projects. An Empowered Group of Agricultural Ministers should be set up to monitor the progress of all State Governments in amending APMC Acts.
- *Need for single agricultural market*: A single unified market does not exist within India and there are significant inter-State barriers to trade. These barriers, which are in form of taxation barriers and physical barriers should be reduced/ eliminated.
- *Addressing information asymmetry*: Information asymmetry among various stake-holders should be minimized. A mechanism/dedicated agency may be set up to collect and disseminate information on production, prices, imports, stocks and availability of essential commodities. Programme on marketing extension should be launched on a major scale.
- Improving infrastructure of backward and forward linkages for agriculture production and marketing. Private sector should be encouraged to bridge the gap for which assistance should be provided in PPP mode. Agricultural marketing should be included in Government scheme for PPP with 20 per cent viability gap funding.
- Strengthen spot and futures markets.
- Integrate warehousing and cold chain infrastructure with spot and futures markets in the form of negotiable warehouse receipts.
- Testing and grading of farm produce for better price realization-framework for setting up accredited agencies. Providing services of grading, standardization, storage and pledge finance by APMCs may be made mandatory.
- Development of human resources in the field of agricultural marketing. Post-graduate degree/ diploma courses in agri-business management should be introduced.
- Promoting farmers market: To improve the efficiency of the distribution channels and to reduce the market intermediation, Government should promote direct or near direct marketing of farm produce which do not involve processing.
- Reduction in farmers marketing risk will improve farm income and thus increase the agriculture production. For the purpose, Government should announce of MSPs well in advance and ensure that no farmer-trader transaction is below MSP. A credible institutional set up for procurement be established in each part of the country. Besides, contract farming should be promoting which are, in a way, future contracts on prices.

- Promote agro-processing infrastructure: Private entrepreneurs should be motivated to set up more processing units. A technology fund for modernization of agro-processing industries may also be set up.
- Agri-marketing activities should be made eligible by RBI for priority sector lending.
- Promote retailing by organized sector/ cooperatives: organized retail should be incentivised to make direct purchases from farmers.
- Maintain adequate stock of essential commodities across the country.
- The Essential Commodities Act should be amended to put non-perishable essential commodities under licensing/ registration order. There should be a centralized authority for issuing registration. Special courts should also be set up for speedy trial of offences under the EC Act.
- Need for enabling provisions to improve transparency in trading/ storage of essential commodities.
- Contract farming sponsors and direct marketing licensee may be exempted from stock limit up to 6 months of their requirement on the basis of business turnover of last two years.
- Market fee/cess should be levied at first transaction between farmer and trader and its subsequent trading between trader and trader; it should be service charge.

1.10.3 Technical Standards Committee, DAC

A study carried out by a Technical Standards Committee set up by Department of Agriculture & Cooperation under Chairmanship of Managing Director, National Horticulture Board in the year 2009 revealed that:

- The majority of cold storages set up for storing fresh fruits & vegetables in warehousing business model in the Country have not been designed by qualified engineers. Instead they have been constructed on the basis of *ad hoc* advice of suppliers of plant & machineries for refrigeration & cooling system and thermal insulation materials under consultancy services provided by chartered accountants who prepared bankable projects for securing bank loans.
- It is a matter of concern that they are only a few manufacturers of critical components of cold chain infrastructure who have performance rating certificates issued by internationally accredited labs as per internationally accepted standards and protocols for their components.
- The situation is not different in cases of reefer vans/ containers and fruit ripening units which have been promoted during previous five year plan periods. In the absence of national standards, these have been constructed and commissioned without following proper technical design procedures with respect to any of the internationally accepted standards.
- It has been noticed that the engineering curriculum does not equip graduate engineers with the skill of designing cold chain infrastructures. Firstly, engineers coming out of engineering colleges have no knowledge of critical storage conditions of fresh horticulture produce; secondly, they find it difficult to make heat load calculation and configure the plant & machineries in energy-efficient manner.
- BIS code has not been updated even in respect of thermal insulation materials. Operators of cold chain infrastructures too are not equipped with knowledge of special nature fresh horticulture produce in terms of their sensitivity to storage conditions and safely.

1.10.4 Task Forces on Cold Chain Development

- The Department of Agriculture & Cooperation had set up an Expert Committee in November 1998 under the chairmanship of Shri JNL Srivastava, then Additional Secretary, DAC to review the existing storage and cold storage capacity and to suggest an action plan to meet the future requirement of the same and to launch the cold chain network in the country. The Expert Committee recommended the creation of additional cold storage capacity of 12 lakh m.t.,

modernization and rehabilitation of sick and closed units with about 8 lakh m.t. capacity and establishment of 4.5 lakh m.t. of storage capacity for onion. These recommendations were used to develop Government schemes for supporting establishment of cold storages.

- Based on the recommendations of the Cold Chain Summit, 2007 organized in New Delhi in March 2007 by Confederation of Indian Industry(CII) jointly with Department of Agriculture and Cooperation, Government of India, a Task Force was constituted in May 2007 for developing a road map for cold chain development in the country under the Chairmanship of Shri Karnail Singh, Additional Secretary, DAC with members of the Task Force drawn from various stakeholders such as Central Government Ministries and Departments, National Horticulture Board, State Governments, State Agricultural Universities, CII and the Industry for drawing a roadmap for cold chain development in the country. The background to this committee was the perception that government support to the sector had been limited, given the high capital requirements for setting of the Cold Storages and the felt need to develop an integrated approach to support holistic development of end-to-end cold chain system in the country on sustainable basis. The four major mandates of the Task Force were: (a) To develop the terms of reference for the Central and State nodal agencies to be constituted for policy execution and to ensure participation of crucial stakeholders in developing cold chain in the country (b) To develop a road map with milestones (c) To detail investment dimension and execution timeframe. (d) To monitor and evaluate the programme on continuous basis. The Task Force report has been prepared based on the detailed visits made to the States and deliberations thereafter. The field visits and deliberations were facilitated by CII through IL&FS as its knowledge partner. The interventions proposed by the Task Force were as under:

    1. Creation of National Centre for Cold Chain Development (NCCD), an autonomous body by the Department of Agriculture and Cooperation – as a dedicated institution for cold chain development – to be managed by professionals/experts drawn from various sectors such as horticulture, cold chain and associated technology, IT logistics, exports and marketing and banking/finance. The NCCD will address needs of industry, technology, infrastructure, logistics, cold chain industry protocols and accreditation as well as credit and policy and related research works.
    2. Need of creating a climate controlled transportation network, through a Special Purpose Vehicle (SPV) providing reefer containers and mobile pre-cooling facilities on competitive pricing.
    3. Creation of National Green Grid to develop a seamless end-to-end transport network to balance demand-supply issues and enable the producers to fetch a proper remunerative price while ensuring the qualitative availability of such perishable produce for longer duration and thereby facilitating price stability.
    4. Subsidy level of minimum of 40% for plains and 55% for hilly and tribal areas for infrastructure projects.

1.10.5 Working Group on agricultural marketing infrastructure for Eleventh Five Year Plan

The Working Group on agricultural marketing infrastructure and policy required for internal and external trade was set up for the Eleventh Five Year Plan by the Planning Commission. The major recommendations of the Working Group on the marketing infrastructure and supply chain were:

- *States to carry out APMC reforms as envisaged in the Model Act.* Ministry of Agriculture should come out with model APMC rules.
- *Licensing procedures is to be simplified*: single unified license for buying, procuring, selling of inputs, storage, and processing of all agriculture commodities for the State as whole be introduced.
- In order to make markets more professionally managed, existing APMC markets could be leased out for up-gradation and management on long term contracts or be converted into public–private partnership markets.

- Institutional innovations aimed at collective action for marketing should be encouraged and promoted.
- Networking or clustering of farmers for the purpose of marketing of their surpluses can be achieved through such alliances as contract farming or cooperative marketing.
- Innovative pricing mechanisms like bonus, share in company equity, and quality based pricing should also be built into contract farming agreements.
- The government intervention in contract farming arrangements should be minimum but it should facilitate the arrangement from outside.
- The NGOs can play a useful role in promoting the linkages of small farmers with agribusiness firms or companies, which should be encouraged as a state policy.
- The existing scheme of Ministry of Food Processing Industries, related to financial incentive to the contractor, in the form of reimbursement of 5 per cent value of raw material should be continued.
- For the success of Corporate Farming, corporate agencies should be encouraged to lease the lands to small farmers as contract growers.
- Primary Agricultural Cooperative Societies should be roped in for primary value addition at the local level and marketing of members' farm products.
- With the increasing tendency of organized retailing (like supermarkets), farmers organizations should be provided support in the form of necessary infrastructure of grading, sorting and packaging that will help in increasing "farm to fork" linkages.

Chapter-2

SCHEMES/ INITIATIVES TO PROMOTE SUPPLY CHAIN INFRASTRUCTURE

The Department of Food & Public Distribution (DFPD), Ministry of Agriculture, Ministry of Food Processing Industries, Agricultural & Processed Food Products Export Development Authority (APEDA) and Department of Animal Husbandry, Dairying & Fisheries and the main nodal agencies for implementing schemes to promote supply chain infrastructure. The Schemes and their progress are given in the succeeding paragraphs.

2.1 Schemes of the Department of Food & Public Distribution

DFPD in the Government of India has been taking responsibility to undertake storage/ procurement programmes of foodgrains (rice and wheat) for the implementation of various food security programmes. The Department has been implementing the scheme of Construction of Godowns. Many steps have been taken for up gradation of warehouses and creation of new godowns. The highlights of the Scheme are as under:-

2.1.1 Construction of Godowns – Private Entrepreneurs Guarantee (PEG) scheme, 2008

To meet the situation arising out of high procurement level of wheat and rice as a result of increase in Minimum Support Price (MSP) during last five years, the Government formulated a scheme for creation of additional storage capacity for foodgrains through private sector participation in 2008. The scheme is known as Private Entrepreneurs Godowns (PEG-2008).

A state wise mapping of existing capacities and analysis of additional requirements was undertaken based on certain criteria by State level committees and a High Level Committee of the Food Corporation of India (FCI). Under the scheme, the Food Corporation of India would now give a business guarantee of ten years for assured hiring. A capacity of about 15.29 million MTs is proposed to be created in 19 States under the Private Entrepreneurs Godown (PEG) scheme through private sector participation and Central and State Warehousing Corporations. Out of this, tenders have been finalized for creation of storage capacity of 52.32 Lakh tonnes by private entrepreneurs. CWC and SWCs are constructing 5.31 lakh tonnes and 15.49 lakh tonnes storage capacity respectively under the scheme. 3.5 lakh tonnes storage capacity has already been constructed by CWC/SWCs.

To make the scheme more attractive for private entrepreneurs, the guarantee period was increased from five years to seven years and subsequently to 10 years. The ceiling of rate fixed for hiring of godowns has been revised from Rs. 3.80 per quintal per month to Rs. 4.78 per quintal per month. In appropriate cases, the High Level Committee has been empowered to decide higher rates by recording reasons in writing.
Besides, certain efforts are being made by Planning Commission for argumentation of storage facilities for the storage of foodgrains through Public Private Partnership (PPP). There is a proposal for setting up

modern silos of 2.0 million MTs in PPP mode. All these efforts will be beneficial for creating integrated modern warehousing capacities in the country. For meeting the capital expenditure on construction of silos, the private entrepreneurs would be eligible for Viability Gap Funding (VGF) under the existing VGF scheme which allows grants of upto 20% of capital cost on the basis of competitive bidding. The FCI would provide an additional VGF of upto 20% of capital costs. For storage of wheat in these silos, the developer will be entitled to receive a recurring service charge provided he meets the required performance and maintenance standards.

2.2 Schemes of the Department of Agriculture and Cooperation

2.2.1 The Department of Agriculture and Cooperation is endeavouring to strengthen the supply chain infrastructure including cold chains through National Horticulture Mission (NHM) – a centrally sponsored scheme, Horticulture Mission for North East and Himalayan States (HMNEH) – a central sector scheme and National Horticultural Board (NHB) – central sector scheme. The utilization under various Schemes during the Eleventh Plan is presented in the following **Table-13**.

(Rs. Crore)

Table-13: Utilisation under Various Schemes of DAC for Supply Chain Infrastructure

Year	NHM	HMNEH	NHB	Total (including other schemes)*
2007-08	917	322	122	1,939
2008-09	1,011	291	124	2,047
2009-10	800	326	145	1,877
2010-11	971	400	152	2,698
2011-12 *allocation*	1,200	500	150	3,186
Total	4,899	1,839	693	11,747

*Other schemes include National Mission on Micro Irrigation (NMMI), National Bamboo Mission (NBM) and Coconut Development Board (CDB).

Source: Report of the Working Group on Horticulture and Plantation Crops for the Twelfth Five Year Plan set up by the Planning Commission

Department of Agriculture & Cooperation has modified its NHM/HMNEH/NHB schemes with effect from 1.4.2010, by upward revision of credit linked back ended subsidy from 25 per cent to 40 per cent of the capital cost of a project in general areas and 33.33 per cent to 55 per cent in case of Hilly & scheduled areas, in respect of units which adopt new technologies. This has been really effective and led to an establishment of 48.55 lakh MT cold storage capacity during 2010-12, which is around 15 per cent of the total cold storage capacity in the country.

2.2.2 The National Horticulture Board (NHB) has been administering the schemes namely (i) Development of Commercial Horticulture through Production and Post Harvest Management of Horticulture Crops; (ii) Capital Investment Subsidy Scheme for construction/ expansion/ modernization of Cold Storages/Storages of Horticulture Produce; (iii) Technology Development and Transfer for promotion

of Horticulture; (iv) Market Information Service for Horticulture Crops, and (v) Horticulture Promotion Service. The aims & objectives of the above mentioned schemes are as under:

i) Development of hi-tech commercial horticulture in identified belts to make such areas vibrant with horticultural activity, which in turn will act as hubs for further development;

ii) Development of modern post-harvest management infrastructure as an integral part of area expansion projects or as common facility for cluster of projects;

iii) Development of integrated, energy efficient cold chain infrastructure for fresh produce;

iv) Popularization of identified new technologies / tools / techniques for commercialization / adoption, after carrying out technology need assessment

v) Assistance in securing availability of quality planting material by promoting setting up of scion and root stock banks / mother plant nurseries and carrying out accreditation / rating of horticulture nurseries and need based imports of planting material.

vi) Promotion and market development of fresh horticulture produce.

vii) Promotion of field trials of newly developed/imported planting materials and other farm inputs; production technology; PHM protocols, INM and IPM protocols and promotion of applied R&D programmes for commercialization of proven technology.

viii) Promotion of applied R & D for standardizing PHM protocols, prescribing critical storage conditions for fresh horticulture produce, bench marking of technical standards for cold chain infrastructure etc.,

ix) Transfer of technology to producers/farmers & service providers such as gardeners, farm level skilled workers, operators in cold storages, work force carrying out post harvest management including processing of fresh horticulture produce and to master trainers.

x) Promotion of consumption of horticulture produce and products.

xi) Setting up of Common Facility Centres in Horticulture Parks and Agri-Export Zones.

xii) Strengthen market intelligence system by developing, collecting and disseminating horticulture database.

xiii) Carrying out studies and surveys to identify constraints and develop short and long term strategies for systematic development of horticulture and providing technical services including advisory and consultancy services.

2.2.2.1 Development of Commercial Horticulture through Production and Post Harvest Management of Horticulture Crops

This is a scheme that provides credit linked back-ended subsidy @ 20 per cent of the total project cost limited to Rs 25 lakh per project in general area and Rs 30 lakh in NE Region, Hilly and Scheduled areas. However, for capital intensive and high value crops under protected cultivation and open air cultivation of date palm, olive and saffron subsidy is @ 25 per cent of project cost with ceiling of Rs.50 lakh (33 per cent of project cost with ceiling of Rs.60 lakh for scheduled and hilly areas) under production related components; and credit linked back-ended subsidy @ 40 per cent of the total project cost limited to Rs 50 lakh per project in general area and @ 55 per cent of project cost limited to Rs 60 lakh in Hilly and Scheduled areas. Pattern of assistance for plastic crates will be 50 per cent of the total cost for Post Harvest Management related projects/ Primary Processing related components.

Enhancing post harvest infrastructure includes setting up of pack house, pre-cooling unit, cold storage, controlled atmosphere (CA) storage, refer transport, ripening chambers etc. Credit linked back ended

subsidy @ 40 per cent of the project cost in general areas and 55 per cent in case of hilly and schedule areas for individual entrepreneurs is available. Under this scheme (post harvest infra.) assistance of Rs.177.97 crore has been provided for establishment of 367 cold storages in various States of the country with the capacity of 2.62 lakh MT.

2.2.2.2 Capital Investment Subsidy for construction/ expansion/ modernization of Cold Storages/Storages of Horticulture Produce is a scheme having components like Credit linked projects relating to Cold Storages including Controlled Atmosphere (CA) and Modified Atmosphere (MA) Stores, pre-cooling units, other Storages for onion, etc., their modernization is eligible for assistance under this component. Under the scheme the assistance will be as credit linked back-ended subsidy @ 40 per cent of the capital cost of project in general areas and 55 per cent in case of Hilly & Scheduled Areas for a maximum storage capacity of 5000 MT per project. The scheme is implemented by NABARD/ NCDC/ NHB.

2.2.2.3 Technology Development and Transfer for promotion of Horticulture is a scheme that has components like (i)Introduction of New Technology (ii) Visit of progressive farmers (iii) Promotional and Extension Activities (iv) Technical know-how from India/Abroad (v) Technology Awareness (vi) Organising/participation in seminars/symposia/exhibitions (vii) Udyan Pandit (viii) Publicity and Films (ix) Awareness for technology up gradation and markets (x) Honorarium to scientists for effective transfer of technology (xi) Accreditation and Rating of Horticulture Nurseries (xii) Mother Plant Nurseries for pedigreed planting material for fruit crops (xiii) Assistance for Common Facilities in Horticulture Parks/ Agri Export Zones etc.

- ***Introduction of New Technology*** is for (i) undertaking Pilot Projects for introduction of new farm inputs, new and appropriate technologies for promoting high quality commercial production and or increase in productivity, growth regulation, plant protection; (ii) developing and introducing new protocols relating to Post Harvest Management, Cold Chain, Primary Processing, Biotechnology and Introduction of New tool/ equipment/ machinery for PHM, storage including cold chain system and handling; (iii) R&D projects for solving specific problems relating to production, PHM, packaging, storage, handling and transport would also be considered on merit basis. Project based on indigenous fruit, vegetables, flowers, medicinal and aromatic plants would also be encouraged for promoting domestic market and exports; and (iv) R&D facilities for bee-keeping and honey production, processing and storage. Assistance under this scheme component is available mainly for applied R & D projects and not for R & D projects, which fall under domain of regular R & D activities of ICAR/ SAU or any other applicant organization.
- ***Promotional and Extension Activities have two Components*** **(**i) to organize demonstrations of modern scientific techniques / technologies, package of production and PHM practices at suitable locations / areas by the NHB; (ii) to organize demonstrations of improved / high yielding varieties of fruits, vegetables, flowers, ornamental plants etc, by NHB. A committee of NHB examines such proposals.
- ***Technology Awareness*****:** Under this component, extension related events are organized with field demonstration of technology and evaluation of extension effort. Up to Rs.50,000/- per event including cost of organizing field trials of technology on participating farmers' fields and carrying

out programme evaluation, preparation of programme evaluation report and its submission to NHB by the Organizer.

- ***Awareness of technology up-gradation, production development, product promotion and market intelligence*:** The scheme, aiming to create awareness of technology up-gradation, product development, product promotion, exploring improved varieties of fruits, vegetables and flowers and market intelligence, shall be in consonance with the WTO commitments and the same would remain as an integrated component as per the objectives of the scheme for the government officers.
- ***Assistance for common facilities in Horticulture Parks/ Agri Export Zones etc.- Implementation and pattern of assistance*:** (i) Horticultural parks set up in identified industrial estates or identified cluster of production proposed to be developed as production hub for back end support to marketing and export needs are eligible for assistance. Notified Agri-Expo Zones are also treated at par with Horticulture Park for the purpose of extending the operation of schemes. (ii) NHB will facilitate PSU and Growers Associations or companies engaged in contract farming in establishment of common infrastructure facilities like collection, sorting, grading, primary processing, packaging, storage godowns, cold chain infrastructure, transport, value addition, marketing, quality control labs, logistics, water supply, effluent treatment plant, training / conference facility etc. (iii) NHB will extend one-time financial assistance to the promoter agency up to 50 per cent of the eligible project cost with ceiling of subsidy of Rs. 4 crore per Horticulture Park for setting up of common Facilities Centre (CFC) such as mobile pre-coolers, pack house, cold chain infrastructure, storage godowns, quality control labs, logistics, primary processing facilities, water supply, effluent treatment plant, training / committee room etc. (iv) Projects promoted by growers associations or companies engaged in contract farming must be credit linked wherein credit component is in the form of term loan from Bank / non-banking financial institution / Marketing Board and subsidy will be back-ended. (v) The cost of setting up of individual production unit would be borne by the entrepreneurs who will set up projects in the park, for which they shall also be eligible for back ended capital investment subsidy under the commercial horticulture scheme of NHB.

2.2.2.4 Market Information Service for Horticulture Crops runs with the following objectives:

- To generate information on wholesale prices, arrivals and trends in various markets of the country for important fruits, vegetables & flowers etc and also on retail prices for increased number of selected markets
- To analyze the trends of arrivals, prices and other related factors of the selected fruit and vegetables such as stock in storage, crop stand etc and generate Market Intelligence Reports
- To establish a nation-wide communication network for speedy collection and dissemination of market information data for its efficient and timely utilization.
- To prepare farmers' advisory and issue the same for the benefit of producer farmers especially by making use of statistics so generated and collected for optimizing returns to the producers
- To collect and disseminate information on international prices prevailing in potential foreign markets vi) To collect and compile horticulture database and strengthen existing system of 'Crop Estimation Survey-Fruits & Vegetables' (CES-F&V) as far as possible

2.2.2.5 **Horticulture Promotion Service**: Under this component, specialized studies and surveys shall be carried out and study / survey reports shall be brought out for use by targeted beneficiaries. In addition,

technical laboratories shall be set up or cause to be set up and also provide technical services including advisory and consultancy services. The scheme has the following components:

- Review the present situation of horticulture development in particular area/ State
- Identify constraints in horticulture development and suggest remedial measures
- Develop short term and long term strategies for systematic development of horticulture,
- Develop primary/secondary data of various aspects on horticulture,
- Provide consultancy services, expert services & establishing labs etc. in pursuance thereof,
- Conduct technical scrutiny and certification of cold chain infrastructure as per implementation protocol for Technical Standards for cold storages etc.
- Preparing reports relating to export competitiveness in the area of fresh horticulture produce,
- Any other component of expert services provided by NHB addressing to identified needs of the sector

2.2.3 Establishment of Terminal/ Wholesale/Retail Markets

2.2.3.1 Market Infrastructure has an importance place in the supply chain of fruits and vegetables. The scheme is being implemented through a subsidy route under **National Horticulture Mission** with active involvement of all stakeholders at various levels under public private partnership mode during the XIth Plan. The subsidy ceiling would be 40 per cent with a floor subsidy of 25 per cent of project cost with a maximum subsidy amount of Rs. 50 crore to the TMC Projects based on competitive bidding. Two Terminal markets projects viz. TMC Patna (Bihar) and TMC Perundurai (Tamil Nadu) have been approved. The bidding for TMC Babangaon has been completed by Maharashtra and recommendation from the state is awaited. In principle approval has been given to TMC Madurai, TMC Kancheepuram and TMC Nagpur to initiate the bid process.

2.2.3.2 Under TMC component, an assistance of Rs.33 crore for establishment of a Terminal Market Complex (TMC) at Pothai, Patna (Bihar) and Rs.28.99 crore for TMC at Perundurai, Erode District, has been sanctioned and in-principle approval has been accorded for establishment of 2 Terminal Market Complex (TMC) in Maharashtra (Thane and Nasik), 2 in Tamil Nadu (Madurai and Chennai) and 1 in Orissa (Sambalpur).

2.2.3.3 With the Retail Trade revolution currently under way in India, it is an opportunity to reverse the loss of fruits & vegetables with a proper supply and distribution system. Under NHM, projects are taken-up by different States on PPP model which has concept of "Hub & Spoke" system for a modern distribution centres.

2.2.4 National Centre for Cold Chain Development (NCCD)

2.2.4.1 The gap in the Cold Chain infrastructure necessitates focused interventions of its establishment at par with global standards and protocols so that F&V produce has a longer shelf life, benefiting not only producers (farmers, processors), consumers and exporters but also enabling a specialized industry to come up with a host of allied and ancillary activities and service providers. With this perspective during 11th Plan Period, National Centre for Cold Chain Development (NCCD) has been promoted jointly with stake-

holders for promotion of quality regime in cold chain infrastructure development and management. NCCD has been mandated to:

- Provide an enabling environment for the cold chain sector to gain prominence and invite the much needed private sector involvement.
- To establish standards and protocols related to cold chain testing, verification, certification and accreditation as per international standards.
- To provide technical assistance to Financial Institutions, Government Departments/ agencies, and industry for selection of cold chain component such as refrigeration units, refrigerated transport equipment, display cabinets, milk tanker etc.
- To offer HRD and technical advisory services to personnel engaged in this sector.

2.2.4.2 As recommended by the Task force on Cold Chain Development, NCCD has been set up as registered Society under Societies Registration Act 1860. NCCD has representation of stake holders such as Central Ministries, Industries Associations of CII and FICCI, Cold Storage equipment Manufacturers and service providers, expert organizations, growers associations & food processors etc. Besides, based on the Task Force report, Department of Agriculture & Cooperation (DAC), Govt. of India has set up a Technical Standards Committee (TSC) headed by Managing Director, NHB. TSC had accordingly, submitted technical standards for storing fresh fruits & vegetables which had been notified for implementation with effect from 1.4.2010. These are:

- Fresh Horticulture produce Not requiring pre-cooling before storage
- (Technical standards number NHB-CS-Type 01-2010)
- Fresh Horticulture produce requiring pre-cooling before storage
- (Technical standards number NHB-CS-Type 02-2010)
- Control Atmosphere (CA) Cold Storage
- (Technical standards number NHB-CS-Type 03-2010)
- Fruit Ripening Units
- (Technical standards number NHB-CS-Type 04-2010)

2.2.4.3 Three technical standards/specializations have been approved by Department of Agriculture & Cooperation (Horticulture Division) and assistance under the schemes of National Horticulture Mission, National Horticulture Board and Horticulture Mission for NE states is linked to adoption of technical standards for establishment of cold storage etc.

NCCD is envisaged to operate in Public-Private Partnership Mode (PPP mode) with stake-holders' participation. Organisation structure of National Cold Chain Development Centre and its bye-laws shall be as approved by the Department of Agriculture & Cooperation, Ministry of Agriculture, Govt. of India. One time grant of Rs. 25 crore, including cost of construction and furnishing of HRD Centre at Nangaloi is earmarked for establishment of the National Cold Chain Development Centre during XI plan. There shall be no cost on NHB on account of operation and maintenance of the NCCD. NCCD shall generate its own resources from services rendered.

2.2.4.4 At present, norms for registration of Cold Chain infrastructure (Cold Storage/CA/MA Storage) have not been prescribed under Warehouse Development Regulatory Authority (WDRA). DAC has constituted a committee under the chairmanship of Managing Director (NHB) to formulate norms for accrediting norms for cold storages. The report is expected to be received in this month. This step would encourage registration and support FPO to make use of WDRA to ensure better liquidity for farmers, as well as transparent price discovery.

2.2.5 Restructured Central Sector Scheme for assistance to NCDC Programmes for Co-operative Development

2.2.5.1 Government of India implements its co-operative development programmes, *inter alia*, through National Cooperative Development Corporation (NCDC). The programmes/schemes being implemented through NCDC are:

- Integrated Cooperative Development Projects in selected districts;
- assistance to cooperative marketing, processing and storage etc. programmes in cooperatively under-developed/least developed States/Union Territories; and
- share capital participation in growers'/ weavers' cooperative spinning mills under the restructured central sector scheme. It has been decided that under this scheme, subsidy component will be provided by Government of India and the loan component will be arranged by NCDC through its own sources.

2.2.5.2 NCDC is a non-equity based development financial institution created solely for the cooperative sector with the objective of planning and promoting programmes for production, processing, marketing, storage, export and import of agricultural produce, food stuff and certain notified commodities and services on cooperative principles. With amendment of the NCDC Act in 2002, scope of activities of the Corporation has been widened to cover livestock, cottage and village industries, handicrafts, rural crafts and certain notified services besides enabling NCDC to lend directly to cooperative societies on furnishing security to the satisfaction of the Corporation. In 2010-11, up to 30.09.2010 an assistance of Rs. 945.40 crore (provisional) has been disbursed by the NCDC against approved outlay of Rs. 3,600 crore.

2.2.5.3 Storage capacity assisted by NCDC has increased from 11 lakh tonnes during 1962- 63 to 149.66 lakh tonnes as on 31.3.2010. NCDC provides financial assistance to the extent of 90 per cent of the block cost to the State Governments for setting up / modernization / expansion / rehabilitation of cold storages and ice plants by cooperatives. In case of direct funding, assistance to the extent of 75 per cent is provided. NCDC has also dovetailed its cold storage programme with National Horticulture Board (NHB) and acts as a nodal agency to route subsidy to State Governments / Cooperatives for cold storage projects. In such cases, quantum of assistance provided by NCDC is reduced by the subsidy available under the Capital Investment Scheme (CIS) of NHB. The scheme provides enhanced back-ended subsidy @ 40 per cent of the project cost for general and 55 per cent in case of hilly and scheduled areas for maximum storage capacity up to 5,000 ton per project at normative cost @ Rs. 6,000 / 7,000 / 8,000 per ton as per prescribed standards under the scheme.

2.2.6 Scheme for Development/Strengthening of Agricultural Marketing Infrastructure, Grading and Standardization

2.2.6.1 This scheme was launched on 20.10.2004 to develop marketing infrastructure in the country to cater to the post-harvest requirement of production and marketable surplus of various farm products. This scheme is reform linked and assistance for development of infrastructure projects will be provided in those States/Union Territories which permit setting up of agricultural markets in private and cooperative sectors and allow direct marketing and contract farming. The main objectives of the scheme are (i) to provide additional agricultural marketing infrastructure to cope up with the large expected marketable surpluses of agricultural and allied commodities including dairy, poultry, fishery, livestock and minor forest produce; (ii) to promote competitive alternative agricultural marketing infrastructure by inducement of private and cooperative sector investments that sustain incentives for quality and enhanced productivity thereby improving farmers' income; (iii) to strengthen existing agricultural marketing infrastructure to enhance efficiency; (iv) to promote direct marketing so as to increase market efficiency through education in intermediaries and handling channels thus enhancing farmers' income; (v) to provide infrastructure facilities for grading, standardization and quality certification of agricultural produce so as to ensure price to the farmers commensurate with the quality of the produce; (vi) to promote grading, standardization and quality certification system for giving a major thrust for promotion of pledge financing and marketing ,credit, introduction of negotiable warehousing receipt system and promotion of forward and future markets so as to stabilize market system and increase farmers' income; (vii) to promote direct integration of processing units with producers; and (viii) to create general awareness and provide education and training to farmers, entrepreneurs and market functionaries on agricultural marketing including grading, standardization and quality certification.

2.2.6.2 During the year 2010-11, a sum of Rs.130.69 crore has been allotted in RE 2010-11 to develop 250 new Marketing Infrastructure projects, 200 Wholesale and 70 Rural Primary Markets besides up-gradation and modernization of 6 Agmark laboratories and their accreditation with National Accreditation Board for Testing and Calibration Laboratories (NABL). An amount of Rs.75.00 crore has been released to NABARD, Rs.11.50 crore to National Cooperative Development Corporation and Rs.3.1543 crore to State agencies.

2.2.7 *Gramin Bhandaran Yojana*

2.2.7.1 Under the Department of Agriculture & Cooperation the scheme was introduced on 1.04.2001 and has been extended in the Eleventh Plan. The main objectives of the scheme include creation of scientific storage capacity with allied facilities in rural areas to meet the requirements of farmers for storing farm produce, processed farm produce and agricultural inputs; promotion of grading, standardization and quality control of agricultural produce to improve their marketability; prevention of distress sale immediately after harvest by providing the facility of pledge financing and marketing credit; strengthen agricultural marketing infrastructure in the country by paving the way for the introduction of a national system of warehouse receipts in respect of agricultural commodities stored in such godowns and to reverse the declining trend of investment in agriculture sector by encouraging private and cooperative sectors to invest in the creation of storage infrastructure in the country.

2.2.7.2 Under the revised scheme w.e.f. 26-6-08 subsidy @ 25 per cent is being given to all categories of farmers, agriculture graduates, cooperatives & CWC/ SWCs. All other categories of individuals, companies and corporations would be given subsidy @ 15 per cent of the project cost. In case of NE States/hilly areas, women farmers & SC/ST entrepreneurs and their cooperatives, subsidy is given at 33.33 per cent. The scheme has now been made more farmer friendly by allowing subsidy for smaller godowns of 50 MT size in general and of 25 MT in hill areas. By the end of December, 2010, 23047 godowns having a capacity of 274.13 lakh tonnes with a subsidy release of Rs.671.96 crores have been sanctioned by NABARD & NCDC all over the country. During 2010-11 (upto 31/12/2010), 1210 rural godowns with a capacity of 17.49 lakh MTs have been sanctioned by NABARD/NCDC.

2.2.8 National Agricultural Insurance Scheme (NAIS):

2.2.8.1 The scheme with increased coverage of farmers, crops and risk commitment was introduced in the country from Rabi 1999-2000 replacing the erstwhile Comprehensive Crop Insurance Scheme (CCIS). The main objective of the scheme is to protect the farmers against crop losses suffered on account of natural calamities, such as, drought, flood, hailstorm, cyclone, pests and diseases. The scheme is being implemented by the Agriculture Insurance Company of India Ltd. (AIC). The scheme is available to all the farmers – both loanee and non-loanee farmers irrespective of their size of holding.

2.2.8.2 It envisages coverage of all the food crops (cereals, millets and pulses), oilseeds and annual commercial/horticultural crops, in respect of which past yield data is available for adequate number of years. Among the annual commercial/horticultural crops, sugarcane, cotton, ginger, jute, onion, potato, tomato, brinjal, turmeric, chillies, garlic, pineapple, annual banana, tapioca, Isabgol, methi, coriander, cumin and fennel have already been covered under the scheme. The premium rates are 3.5 per cent of sum insured for bajra and oilseeds, 2.5 per cent for other Kharif crops, 1.5 per cent for wheat, and 2 per cent for other Rabi crops. In the case of commercial/horticultural crops, actuarial rates are being charged. Under the scheme, small and marginal farmers were originally provided a subsidy of 50 per cent of the premium charged from them. The premium subsidy has now been phased out over a period of 5 years and at present, 10 per cent subsidy in premium is available to small and marginal farmers which is shared equally by the Central and State Governments.

2.2.8.3 The scheme has been implemented in Kharif 2007 (1 State), Rabi 2007-08 (4 States), Kharif 2008 (10 States), Rabi 2008-09 (10 States), Kharif 2009 (13 States), Rabi 2009- 10 (10 States), and Kharif 2010 (13 States). During the last four years, i.e. 2007-08, 2008-09, 2009-10 and 2010-11, Rs 69.19 crore, Rs. 100.00 crore, Rs.120.00 crore and Rs. 350.00 crore, respectively have been released as Government of India share towards subsidy for premium provided to the farmers.

2.3 Schemes operated by Ministry of Food Processing Industries (MoFPI)

2.3.1 Scheme for Technology Upgradation/ Establishment/ Modernization**:** The Ministry of Food Processing Industries (MFPI) is the nodal agency for implementing the scheme. The assistance will be in

the form of grant subject to 25 per cent of the plant and machinery and technical civil works subject to a maximum of Rs.50 lakh in General Areas and 33.33 per cent up to Rs.75 lakh in Difficult Areas.

2.3.2 Establishment of Mega Food Parks**:** The Scheme has been developed with an objective of facilitating the creation of adequate infrastructure facilities along the value chain. The scheme provides for creation of Special Purpose Vehicle for the establishment of the Mega Food Park. Financial assistance under the Scheme is through provision of one time capital grant of 50 per cent of the project cost (excluding land cost) for general areas and 75 per cent in difficult, hilly areas and ITDP notified areas subject to a maximum of Rs 50 crore per project. The components of the project cost include core infrastructure facilities like cleaning, grading, sorting, packing, dry and temperature controlled warehouses, ripening chambers, reefer vans etc. at collection centre and primary processing centres; buildings for common facilities like testing laboratory, sorting, grading, packing, specialized and dry warehouses, irradiation facilities, stems sterilization units, food incubation cum development centres etc. at central processing centre; factory buildings for MSMEs; basic infrastructure like roads, drainage, water supply, electricity supply, effluent treatment, parking bays; non-core infrastructure like administrative buildings, training centres, trade centre/display centres, workers hostels, canteen, marketing support system etc. not exceeding 10 per cent of project cost; hiring of domain consultants for preparation of DPRs, supply chain management It is envisaged to setup 1 Mega Food Park each for a cluster of about 3 to 4 Districts. Due care will have to be taken for smaller state and left out regions.

2.3.3 Establishment of Cold Chain, Value addition and Preservation Infrastructure**:** The objective of the scheme is to facilitate creation of integrated cold chain and preservation infrastructure facilities without any break from farm to consumer. The scheme mentions three types of facilities to be created such as 1) Minimal processing centre at the farm gate level having facilities like weighing, sorting, grading, pre-cooling, CA/MA storage, IQF and normal storage facilities; 2) Mobile pre- cooling vans and reefer trucks; and 3) Distribution hubs having facilities such as CA/MA chambers, multi-purpose cold stores, variable humidity stores, IQF and blast freezing etc. Financial assistance is in form of grant-in-aid of 50 per cent of the total cost of plant and machinery and technical civil works for general areas and 75 per cent for NE region, difficult and subject to a maximum of Rs 10 crore per project.

2.3.3.1 Based on the experience and encouraging feedback from industry, the Ministry obtained approval for removal of ceiling on number of cold chain projects and for up-scaling of the Scheme within approved financial budget for 11th Plan. 49 cold chain projects have been approved so far which met all eligibility parameters within stipulated timeline. Another 30 have been recently sanctioned by the Government and approval for the individual proposals is likely to be given by July 2012.. The estimated total subsidy in these 79 projects is Rs 610 crores.The 49 approved proposals envisage a total investment of about Rs.1100 crore which would be creating an additional aggregate cold chain capacity of about 2.5 lakh MT in the country. Most of these projects are under implementation . 8 projects have been completed and a significant part of them may be completed by end of this year.

2.3.4 Modernization of Abattoirs

2.3.4.1 The objective is modernize existing abattoirs or establish modern abattoirs promoting scientific and hygienic slaughtering, application of modern technology for waste management, better by product utilization, provision of chilling facility, retail cold chain management etc. under PPP mode with the involvement of local bodies (panchayats or municipalities) on build-own-operate/build-operate-transfer (BOT)/Joint venture(JV) basis. Financial assistance under the Scheme is through grant of 50 per cent of the total cost of plant and machinery and technical civil works for general areas and 75 per cent for NE region, difficult, hilly and ITDP notified areas subject to a maximum of Rs 15 crore per project.

2.3.4.2 The Ministry initially has taken up 10 abattoir projects in the first phase. The approved 10 projects are under various stages of implementation in Dimapur (Nagaland), Kolkata (West Bengal), Ranchi (Jharkhand), Shimla (Himachal Pradesh), Hyderabad (Andhra Pradesh), Patna (Bihar), Ahmednagar (Maharashtra), Jammu (Jammu & Kashmir), Srinagar (Jammu & Kashmir) and Shillong (Meghalaya). Two of these projects viz. Dimapur and Ahmednagar have been completed and commissioned. The third project at Hyderabad is likely to be completed by December, 2011. Other projects have also received requisite approvals, including environmental clearance, and are under construction. Major challenges of the Scheme remain identification and acquisition of land and complex regulatory issues related to such projects. Considering the challenges of the sector, though, the progress of the Scheme may be considered satisfactory.

2.3.5 National Mission on Food Processing (NMFP): A new scheme for 12th Plan

In the report of the Working Group on Food Processing Industries, it has been proposed to introduce a National Mission on Food Processing for the 12th Plan period. The broad objectives and coverage under NMFP has been proposed as under:-

Objectives of NMFP

a. To spread the message of significance of food processing for enhancing agricultural productivity and farmers income in the country.
b. To assist the state governments in creating requisite synergy between their agricultural plans and development of food processing sector.
c. To assist the state governments in addressing both institutional and infrastructural gaps along the Value Chains and thus create efficient Supply Chains for agricultural produces.
d. To promote initiatives for skill development, training and entrepreneurship which would meet needs of both post-harvest management and food processing industry.
e. To assist MSMEs in setting up/modernization of food processing units by providing need based support in terms of capital/technology/skill etc.
f. To assist food processing industry to meet requisite standards in terms of food safety laws and market demand, both domestic and international.

Major Programmes/Schemes to be covered under NMFP

a. Scheme for Technology Up-gradation / Setting up / Modernization / Expansion of Food Processing Industries
b. Scheme for supporting cold chain facilities for Non-Horticultural produces and Reefer Vehicles
c. Scheme for creating Primary Processing Centres/Collection Centres in rural areas
d. Scheme for Modernization of Abattoirs
e. Scheme for Modernization of Meat Shops
f. Scheme for Human Resource Development (HRD)
g. Scheme for Promotional Activities
h. Scheme for Up-gradation of Quality of Street Food

2.4 Scheme of Agricultural & Processed Food Export Development Authority (APEDA)

Agricultural & Processed Food Export Development Authority (APEDA) of the Ministry of Commerce & Industry has a scheme for providing financial assistance to the extent of 50 per cent of the project cost subject to ceiling of Rs.10 lakhs per beneficiary under the scheme titled assistance to Semi Government, State Government, Public Sector Undertakings for conducting surveys, feasibility studies etc. APEDA also provides 100 per cent grant-in-aid towards establishment of common infrastructure facilities or any other Government or Public Sector agency like Airport Authority of India or Port Trust etc.

2.5 Schemes of the Department of Animal Husbandry, Dairying & Fisheries

The Department of Animal Husbandry, Dairying & Fisheries is also involved in strengthen cold chain infrastructure in dairy sector. Milk and milk products being perishable in nature, cold chains for dairy sectors have been established with installation of Bulk Milk Coolers at village level close to the area of milk production for cooling and holding milk. The department has been implementing (i) Intensive Dairy Development Scheme (IDDS) since 1993-94 with 100 per cent grants in aid for the processing and marketing including equipment for bulk milk coolers, chilling centers, refrigerated tankers and cold storage; (ii) Strengthening infrastructure for Quality and Clean Milk Production (SIQ & CMP) since 2003-04 with 75 per cent grant-in-aids to profit making milk unions by the Government of India and 100 per cent for other milk unions for installation of bulk milk cooler; (iii) Dairy Entrepreneurship Development Scheme (DEDS) since 2004-05/2010-11 to encourage entrepreneurs in setting up modern dairy infrastructure for clean milk production including installation of bulk milk coolers (up to capacity of 2000 ltrs.), transportation facilities including refrigerated vans, cold storage facility for milk and milk products and dairy marketing outlets with Government of India's subsidy of 25 per cent back ended capital for general category and 33.33 per cent subsidy for SC & ST beneficiaries .

The various schemes of different Ministries/ Departments in Government of India for encouraging investments in supply chain are tabulated below:

Table-14: Component Details of the Schemes of different Ministries/Departments for Encouraging Investments in Supply Chain

Department of Agriculture & Cooperation

a) National Horticulture Mission (NHM) - for States other than North East and Himalayan States, Centrally sponsored scheme

Component Details	Maximum Permissible Cost	Pattern of Assistance
1. Pack house/ On farm collection & storage unit	Rs. 3.00 Lakh/ per unit with size of 9Mx6M	50% of the capital cost.
2. Pre-cooling unit 3. Mobile pre cooling unit	Rs. 15.00 lakh for 6 MT capacity Rs. 24.00 lakh/unit for 5 MT capacity	Credit linked back-ended subsidy @ 40% of the cost of project in general areas and 55% in case Hilly & Scheduled areas for individual entrepreneurs.
4. Cold storage units (Construction/expansion/Modernization) 5. C.A/M.A. Storage units 6. Refer vans/ containers 7. Primary/ Mobile / Minimal processing unit 8. Ripening Chamber	Rs. 6,000/MT for 5,000 MT capacity Rs.32,000/ MT for 5000 MT capacity Rs. 24.00/ unit for 6 MT capacity Rs. 24.00 lakh/unit. Rs. 6,000/MT for 5000 MT capacity	Credit linked back-ended subsidy @ 40% of the capital cost of project in general areas and 55% in case of Hilly & Scheduled areas in respect of only those units which adopt new technologies which are energy efficient with provision of insulation, humidity control & advance cooling system with provision of multi chambers. Technical standards, parameters & protocol issued by the Department.
9. Functional Infrastructure: for collection, sorting/ grading, packing units etc	Rs. 15.00 lakh/unit	Credit linked back-ended subsidy @ 40% of the capital cost of project in general areas and 55 % in case of Hilly & Scheduled areas for individual entrepreneurs.

b) Horticulture Mission for North East in Himalayan States (HMNEH) - Centrally Sponsored scheme

1. Pack house/ On farm collection & storage unit	Rs.3.00 Lakh/ per unit with size of 9Mx6M	50% of the capital cost.
2. Pre-cooling unit 3. Mobile pre cooling unit	Rs.15.00 lakh for 6 MT capacity Rs.24.00 lakh/unit for 5 MT capacity	Credit linked back-ended subsidy @ 55% of the project cost.
4. Cold storage units (Construction/expansion/Modernization) 5. C.A/M.A. Storage units 6. Refer vans/ containers 7.Primary/ Mobile / Minimal processing unit 8.Ripening Chamber	Rs.6000/MT for 5000 MT capacity Rs.32,000/ MT for 5000 MT capacity Rs.24.00/ unit for 6 MT capacity Rs.24.00 lakh/unit. Rs.6000/MT for 5000 MT capacity	Credit linked back-ended subsidy @ 55% of the project cost which adopt new technologies which are energy efficient with provision of insulation, humidity control and advance cooling system with provision of multi chambers. Technical standards, parameters and protocol issued by the Department to be adopted.
9.Functional Infrastructure: for collection, sorting/ grading, packing units etc	Rs.15.00 lakh/unit	Credit linked back-ended subsidy @ 55 % of the project cost.

c) National Horticulture Board (NHB) – for all States, Central Sector Scheme

1.Cold storage units (Construction/expansion/Modernization)	Rs.6000/MT for 5000 MT capacity	Credit linked back-ended subsidy @ 40% of the capital cost of project in general areas and 55% in case of Hilly & Scheduled areas in respect of only those units which adopt new technologies which are energy efficient with provision of insulation, humidity control and advance cooling system with provision of multi chambers. Technical standards, parameters and protocol issued by the Department to be adopted.
2. C.A/M.A. Storage units	Rs.32,000/ MT for 5000 MT capacity	
3. Refer vans/ containers	Rs.24.00/ unit for 6 MT capacity	

Table-14: continued		
Component Details	**Maximum Permissible Cost**	**Pattern of Assistance**
Ministry of Food Processing Industries (MoFPI)		
Integrated Cold Chain, Value Added Centre, Packaging Centre and Irradiation Facilities. The components of the Scheme are at *Note 1*:	Maximum of Rs.10.00 Crore.	Financial assistance (grant-in-aid) of 50% the total cost of plant and machinery and technical civil works in General areas and 75% for NE region and difficult areas (North East including Sikkim and J&K, Himachal Pradesh and Uttarakhand).
Ministry of Commerce – APEDA		
Common infrastructure development assistance for establishment of perishable cargo.		100% of eligible cost
Pack house and export oriented units for perishables	Rs.25.00 lakh/beneficiary	25% of the eligible cost.

Note 1: (a) Minimal Processing Centre at the farm level and this centre will have facility for weighing, sorting, grading waxing, packing, pre-cooling, Controlled Atmosphere (CA)/ Modified Atmosphere (MA) cold storage, normal storage and IQF. (b) Mobile pre-cooling vans and reefer trucks. (c) Distribution hubs with multi product and multi CA/MA chambers cold storage/Variable Humidity Chambers, Packing Facility, CIP Fog treatment, IQF and blast freezing.

Given the number of schemes there needs to be better synergy between the schemes of different Departments/Ministries especially those of Department of Agriculture & Cooperation (DAC) and Ministry of Food Processing Industries (MFPI).

There has been a relative neglect of the non-horticulture cold chains especially those relating to meat, poultry and fishing. State Governments need to to be actively involved in developing cold chain for these products through their Animal Husbandry & Fisheries Departments.

Chapter-3

ESTIMATES & PLANS ON THE SUPPLY CHAIN SYSTEM

3.1 Working Group on Agriculture Marketing – Twelfth Plan

3.1.1 The Working Group on Agricultural Marketing set up by the Planning Commission for the Twelfth Plan period has highlighted the following major issues and concerns with regard to marketing of horticulture products:

(a) Too many intermediaries resulting in high cost of goods and services.
(b) Inadequate infrastructure of storage, sorting, grading and post-harvest management.
(c) Private sector unwilling to invest in logistic or infrastructure under prevailing conditions.
(d) Price setting mechanism not transparent.
(e) *Mandi* staff ill-equipped and untrained.
(f) Market information not easily accessible.
(g) Essential Commodities Act impedes free movement, storage and transportation of produce.

3.2 Projections for Financial Resources Requirements for the Twelfth Plan

3.2.1 There are three Ministries/Departments in Government of India which are directly involved in strengthening of the supply chain infrastructure for agricultural produce. These are Department of Agriculture, Ministry of Food Processing Industries and the Department of Food and Public Distribution. Certain projections for resources requirements have been made by different Working Groups set up by the Planning Commission for the Twelfth Plan period.

3.2.2 The Working Group on Horticulture and Plantation Crops for the Twelfth Plan has projected the total resources requirement for horticulture development at Rs. 50,600 crore for the Plan period (as per the details given in **Annexure-10**). Of this, resources requirement for Post-Harvest Management (PHM) and cold storages amount to Rs. 7,255 crore.

3.2.3 The Working Group on Agricultural Marketing for the Twelfth Plan period has estimated the resources requirements for the Plan period at Rs. 20,208 crore, and the details are at **Annexure-10**

3.2.4 The Ministry of Food Processing Industries (MoFPI) is also involved in strengthening of marketing and cold chain infrastructure in a big manner. The Working Group on Food Processing Industries for the Twelfth Plan has estimated the budgetary requirements for the Ministry of Food Processing Industries at Rs.15,304 crore in the Twelfth Plan as against Rs.4,031 crore in the Eleventh Plan. Of this, requirements under Infrastructure Development Scheme are pegged at Rs. 5,225 crore and under National Mission for Food Processing, requirements are placed at Rs.6,533 crore. It may be mentioned that the Infrastructure Development Scheme of MoFPI has three components viz. (i) Mega Food Parks Scheme, (ii) Scheme for Cold Chain, Value Addition and Preservation Infrastructure, and (iii) Scheme for Modernization of Abattoirs.

3.2.5 In so far as the Scheme for Cold Chain is concerned, the Scheme was launched in the Eleventh Plan. In the first phase, only 10 projects were assisted in 2008-09. For second phase, the Ministry has received 164 proposals despite stiff eligibility conditions in terms of minimum net worth (1.5 times the grant sought), appraisal note from banks/financial institutions and sanction letter from bank (for term loan). Of the 164 proposals, 39 cold chain projects have been approved initially envisaging an investment of Rs.850 crore which would help creating additional cold chain capacity of 2.5 lakh MT. For assisting remaining proposals, in-principle approval has been taken by the Ministry from the Planning Commission. For the Twelfth Plan, the Ministry proposes to support 120 more integrated cold chain projects, of which 20 projects would be of irradiation facilities. The total requirement for cold chain projects is estimated at Rs. 1,675 crore including 120 new projects and 74 projects carried over from the Eleventh Plan. The break-up of budgetary assistance proposed under Infrastructure Development Scheme is placed at **Annexure-10**.

3.2.6 Working Group on Horticulture and Plantation Crops for the Twelfth Plan period has recommended integration of various ongoing schemes for horticulture development into an **Integrated National Horticulture Mission**. The schemes to be merged include NHM, HMNEHA, NHB, CDB, NMMI and NBM. Recommendations have also been made with regard to discontinuation of certain existing scheme components and replacing them by new scheme components. The Working Group has recommended continuation of existing schemes for post-harvest marketing during the Plan period with the same cost and subsidy norms. However, for cold storages, the ceiling of 5,000 m.t. is proposed to be relaxed for infrastructure under National Green Grid and Terminal & Wholesale Markets. The Committee recommends that the Department of Agriculture and Cooperation may examine these recommendations and take suitable necessary action. Further, the Department of Agriculture and Cooperation has requested for providing Rs. 5,000 crore for NHM in the 12th Plan exclusively for cold storage/chain development for back-ended credit linked support to private entrepreneurs through State Governments. The Committee recommends that Planning Commission may examine this suggestion and consider providing suitable Plan assistance.

3.2.7 The Working Group on Food Processing Industries for the Twelfth Five Year Plan has recommended launch of the **National Mission for Food Processing** (NMFP) based on the twin principles of decentralization and outreach. This has found mention in the Budget Speech 2012 of the Hon Finance Minister. It envisages a larger role of State Governments as implementing agencies in Ministry's various schemes with a three tier structure at National, States and Districts level. It is expected to be an umbrella scheme covering different aspects such as setting up /modernization of food processing industries, supporting cold chain/reefer facilities, creating primary processing centres, modernization of abattoirs/meat shops and human resources development. The Working Group has recommended resources requirement of Rs. 6,533 crore for the Twelfth Plan, of which Rs. 2,600 crore would be towards the Scheme for technology up-gradation/setting up/modernization/expansion of food processing industries.

3.2.8 In so far as storage of foodgrains is concerned, the Central Government has already initiated steps for creation of additional storage capacity of 17 m.t., including 2 m.t. in form of silos. Since off-take of foodgrains under PDS is likely to be higher on account of lower issue prices under the proposed National Food Security Bill, it is expected that after these initiatives, the storage requirement of foodgrains would be adequately met during the Twelfth Plan period. The estimated expenditure (Rs. 1,100 crore per year) on account of creation of additional storage capacity of foodgrains (both under PEG scheme and for silos) is

non-Plan in nature and the Plan component is largely estimated for construction of additional storage capacity in the North Eastern states for which a sum of Rs.568 crore has been sought.

3.2.9 The Task Force constituted by Government of India in 2007 had proposed the creation of following capacities in cold storage. The total investment was estimated to be Rs. 18,500 crore including Rs. 12,000 crore for the creation of additional cold storage capacity and Rs. 6,500 crore for cold chain infrastructure at prices prevailing in 2007

	Type of Infrastructure	**Capacity (in tonnes)**
1	Integrated Pack House	15,540
2	Integrated Ripening Chambers	11,625
3	Up-gradation (including pre-cooling, sorting & grading), creation and revival of potato cold storages	3,383,600
4	Deep Freezer	36,000
5	Controlled Atmosphere Storage for apples and other stone fruits	103,000
6	Mega Perishable Commodity Complex at major consumption cum export centers	3,00,000
7	Refrigerated containers including insulated pre-cooled vans	1,000 nos.
8	Mobile pre-coolers	100 nos.

3.2.10 The National Spot Exchange has made an estimate in December 2010 (**Annexure-11**), of the cold storage requirement in the country, keeping in view the highest arrival/harvesting of storage fruits and vegetables in a month. The requirement is pegged at 61.13 m.t.. The gap or shortfall was estimated in 2010 at around 37 million tonnes, which would have reduced to around 32 million tonnes by 2012, given the present storage capacity of about 29 million tonnes. The National Spot Exchange also observed that normally 50 per cent of the capacity is required for storable surplus of the identified fruits and vegetables, and thus cold storage capacity required would about 20 million tonnes in the next 10 years. Looking into the present capacity of around 29 million tonnes, the present gap works out to around 32 million tonnes.

3.2.11 The Working Group on Warehousing Development and Regulation for the Twelfth Plan period has estimated the warehousing storage gap at 35 m.t. in the next 5 to 10 years for foodgrain storage, which appears to be on a higher side. Overall, it can be estimated that country needs to add cold storage capacity of about 20 m.t. over the next 6 years.

3.2.12 A separate detailed study needs to be done to understand of the manner in which the extent and pattern and demand for cold chains is likely to arise, while covering the aspect of the wide variety of cold chain produce and their integration with processing. No such study has been done for cold chains as distinct from cold storage for which several studies have been done and therefore it needs to be carried out.

3.3 Resources Sought in the Twelfth Plan

3.3.1 These projections and assessment of requirements under various heads for strengthening supply chain, add up to a resources requirements for strengthening supply chain infrastructure at Rs. 25,000 crore. The break-up of the resources projection is provided at **Annexure-10**. While part of the financial requirements would need to be met by the Government through the Plan resources, private investment must be the key to meet the resources gap.

Chapter-4

CONCLUSIONS AND RECOMMENDATIONS

4.1 Suggestions for a New Approach

The Committee has received some valuable ideas from some of our members from the private sector and their ideas are first summarized here.

4.1.1 Plan Suggested by CII

The Confederation of India Industry (CII) has through one of our committee members made some pertinent observations on the challenge before us. After taking into consideration the above issues, and based on the consultations with various stakeholders, they are of the opinion that it is necessary to embark on a set of new initiatives in order to achieve the goals.

- Farmers are comfortable in dealing with the Commission Agents as are the retailers. The commission agents offer ready cash to farmers and extend credit to the retailers. The reach of the commission agents and the informal and flexible business relationship they enjoy render them as important stakeholders. At present, their business thrives on the fact that there is no cold chain infrastructure in place.
- Farmers do not have any access to credit in the absence of Negotiable Warehousing Receipt for perishables.
- Retailers need credit, and the Cash and Carry Wholesale Retail is not able to penetrate the market. Since there is no scale, even Cash and Carry Wholesale Retail players are not investing adequately in the back-end.
- Therefore, a possible option is to chalk out a plan that involves partnership with Commission Agents and explore the possibility of getting them invest in cold chain infrastructure.
- At the same time, the Negotiable Warehousing Receipt mechanism must be in place for perishables, so that the farmers can avail credit and trade the commodities when the prices are attractive.
- It is necessary to see how the Cash and Carry format can penetrate and whether they can co-exist with the Commission Agents.
- The other idea is to identify specific commodities for specific States to specialize in, invest in integrated cold chain infrastructure for the same, create a brand for the products, expand domestic and export markets and aim at attractive price realization. For example, can we not create value around Tamil Nadu Bananas just like for Florida Oranges? The intention is to partner with the farmers and traders in Tamil Nadu and get a model developed. The CII Cold Chain Task Force has prepared the Feasibility Reports for Bananas for Tamil Nadu and Apples for J&K.
- Other Leverage Points: There is a need for allowing FDI in multi-brand retail and also expanding the market for Processed Food.
- APMC Act: There are other hurdles such as APMC Act etc., but with persistent efforts and dialogue, we can convince the State Governments to see the value in making changes.

CII has also indicated that at present there are plethora of clearances and licenses required for setting up of cold storages, some of which are as under:-

1. Change of land usage and land conversion. (District Collector or Competent Authority must issue non-agriculture land certificate). This is one time approval.
2. If the land falls under Gram Panchayat, NOC from Gram Panchayat is necessary. This is also one time requirement.
3. Approval of building plan. This is one time requirement.
4. If the building is taller than 15 metres, fire safety approval is required. This is periodic, but there may not be taller buildings for cold storages.
5. Approval under Factories Act. (Two or one year validity).
6. NOC from Pollution Control Board. (Two or one year validity).
7. SSI registration in case of Small Scale enterprises. (One time and periodic renewal).
8. Approval from local Excise Department for availing CENVAT exemption for Cold Storage equipment (one time).
9. Formalities to avail subsidies.

CII has requested that there is a need for simplification of these requirements. Besides, if possible, some arrangement could be made by State Governments for providing pre-approved and ready to occupy lands or buildings for the purposes of investment in cold storages.

4.1.2 Supply chains for Horticultural Products – Note from Shri S Sivakumar, ITC Ltd.

In a paper submitted by Shri S Sivakumar, it has been suggested that fruits and vegetables can be classified into three segments, based on their shelf life under ambient or controlled climate conditions. Segment 'A' can be products such as potato, apple and chillies which can be stored for 6-8 months, Segment 'B' can be of products like grapes and pomegranates which have a moderate shelf life and Segment 'C' can be those products which have a short shelf life of few days and which may not need cold chains much. Similarly, there can be two types of markets viz. 'open market tansactions system' under the conventional APMC regulations and 'privately coordinated supply chains' supplementing open markets. These segments and market systems have been elaborated in the paragraphs 1.7.7 and 1.7.8. The solutions for each of these segments may be different and can be categorised under different heads viz. (1) Market Linkages, (2) Agents, (3) Institutional Change, and (4) Financial Incentives, as indicated in the Table below:-

	Open Market Transactions System	Privately Coordinated Supply Chains	
Segment A	(1) Can continue to operate as day's price based transaction system, without any backward or forward linkages (2) Catalyse independent produce grading systems Vs the traditional visual quality assessment (3) Reform APMC to allow Private Markets (3) Within the current market yards, replace licenses with Financial Guarantees, so anyone giving guarantee can participate in bidding (3) Regulatory Authority independent of APMC Boards or Executive (4) Financial incentives to Commission Agents interested in creating cold chain infrastructure, as recommended in the last column	(1) The market signals to transmit from consumer to the farmer in real time, for the production system to respond. (1) The crop management extension system needs to extend beyond farm productivity to post harvest management practices too (2) Producers Organisations, the Branded & Packaged Foods Companies, Food Processors, Large Wholesalers and Retailers, Exporters (3) Reform APMC to permit Direct Marketing and Contract Farming (3) Modern Terminal Markets and Electronic Spot Exchanges (3) Appropriately regulated Futures & Options markets for price discovery and risk management (3) India as one common market with VAT / GST system, and no local taxes	(4) Increase the quantum of subsidies to take care of the (a) increase in the cost of equipment since the time previous limits were fixed, (b) scale at which different modules achieve economies, and (c) viability gap
Segment B			(4) Viability Gap Funding under PPP. This bidding could be done a la roads, for cold chains designed for different products / locations; or Government could Build, Outsource management, and eventually privatise the assets
Segment C			(1) Staggered production aligned to demand signals; Buy-back arrangements where relevant & necessary (3) Rythu Bazaars (Farmers Markets in nearby Towns) (4) Venture Funds to experiment and innovate Business Models that can deliver (1) above

4.1.3 Papers submitted by Shri Sanjeev Chopra, JS, DAC

A total of six papers were submitted to the Committee by Shri Sanjeev Chopra, JS, DAC who is also the Mission Director for NHM. These papers covered subjects such as Safal National Exchange, Fresh and Healthy Enterprises Limited, supply chain inefficiencies, initiatives of DAC, ensuring competition/price discovery & dedicated horticulture train. These papers provided useful inputs to the Committee keeping in view the overall terms of reference and are enclosed at Annexure-12.

4.2 Broad Observations of the Committee

4.2.1 There is ample evidence of a sharp increase in the output of horticultural produce, as also that of other perishables, such as dairy and fisheries.

4.2.2 This increase in domestic production has come as a response to the increase in domestic demand. International trade (export of fresh farm produce) is a very small proportion of domestic output. Thus the output response has been to domestic demand.

4.2.3 In 2011/12 production of fruit and vegetables was 2.7 and 2.6 times that of the output level two decades ago, i.e. in 1991/92. This expansion was much higher than that for cereals, where the 2011/12 output level was 1.5 times that of 1991-92. A similar and more marked difference may be seen in the most recent past decade (2001/02 to 2011/12) where output of fruit and vegetables has increased by 80 and 69 per cent respectively over 2001/02, while output of cereals has grown by 17 per cent in the same period.

4.2.4 However, the rate of increase in the prices of fruit and vegetables have been higher than that for cereals especially in recent years, and has been a major contributor to the sharp increase in the inflation level for primary food. As has been noted earlier, inflation in primary food has been significantly greater than that of manufactured products and appears to be a driving force behind the higher inflationary pressure.

4.2.5 The proportionately higher increase in the prices of horticultural produce and other perishable farm items, suggest that (a) there is excess demand in the domestic market and (b) their higher output levels will indeed be absorbed by domestic consumption demand.

4.2.6 This clearly justifies energetic efforts to encourage the continued expansion of horticulture, animal husbandry and fisheries, in order to service increasing domestic demand.

4.2.7 The data shows that for fruit and vegetables, the price at the first point of sale in large *mandis* as a proportion to the final retail price, is in the range of 25 to 40 per cent. This proportion may be lower, if smaller *mandis* were to be considered.

4.2.8 However, the farm gate price is likely to be significantly less than the sale price recorded in *mandis*, because it is the aggregator who for the most part brings the produce to the *mandi* and there is the matter of his expenses, margin and wastage.

4.2.9 The inference is that (a) the benefits of demand expansion is not passing adequately to the farmer and (b) the benefits of higher production and productivity is not passing adequately to the consumer. All the evidence suggests that this is on account of the large deficiencies in the logistics system in between the farm to the final consumer.

4.2.10 The inefficiency in the logistic system appears to stem from

(a) **Physical inadequacies:** Multiple handling of produce, inadequate cold chains which leads to high wastage and bunched-up supply.

(b) The inadequacy in cold chains across-the-board, **fails to smoothen out the supply which is seasonal, in relation to the demand which is constant**, and results in regular episodes of scarcity and glut conditions.

(c) **Institutional shortcomings** flowing from the way in which APMC legislation has perpetuated a pre-modern framework with uncompetitive and non-transparent markets, in which commission agents do not have an incentive to change their age old method of operation. It must be noted that commission agents not only draw sustenance from the "closed shop" flowing out of licenses, but also function as financers by providing credit to their buyers and ready cash to farmers. Thus, the principal role of the commission agent is that of a financier-intermediary.

(d) The initiatives of Government have been both on the production side, as well as on the storage side. On the production front, the National Horticulture Board and other agencies, including State agencies, have played a creditable role in helping farmers to increase their production and productivity. There is considerable potential to be exploited, both horizontally through further extension and also vertically through intensification. Both these avenues must be pursued with energy.

(e) There have been a number of schemes to encourage cold chain storages. However, the success on this side has not yet been significant, perhaps with exception of cold chain for potatoes. However, as has been noted, the large scale cold chain of potatoes does not seem to have cured the huge price volatility with the price of potatoes regularly crashing at the time when the potato harvest comes in.

4.3 Strategies

The committee is of the view that it is possible to visualize a sea change in the horticulture supply chain by way of a **strategy** that involves four points of intervention, namely:

- AGENTS
- MARKET LINKAGES
- INSTITUTIONAL CHANGE
- FINANCING & INCENTIVES

4.3.1 AGENTS

Who would be the economic agents who might drive investment in cold chains? Two kinds of agents clearly come to mind. The first is cooperatives of farmers or producer companies established by growers. The second category is private investors. In India, as well as world wide, there have been successful instances of cooperatives/producer companies, but also many not so successful experiences. It would be desirable that both channels namely, cooperatives/producer companies and private sector

enterprises have an equal opportunity to build up the cold chain infrastructure. In the private sector, it is generally felt that large outside companies may hesitate to actually invest in such facilities. However, existing commission agents may choose to participate.

- It is believed that large private investors are not ready to enter the cold chain market since standalone cold rooms based on a rental revenue model, is not presently viable, even after taking into account the current subsidies embedded in various schemes. However, cold rooms that created by traders/commission agents appear to be viable, since their model is based on price arbitrage; namely, buying cheap when arrivals peak and selling later when arrivals dry up.

- What might make the basic revenue model viable both for outside private investors as well as for commission agents, other than price arbitrage? Clearly, a revenue model that is based on rental has a high risk emanating from uncertainties about demand for rental space. The investor is not necessarily in a position to interact with the downstream market, where the demand for such rentals can emanate. Therefore, the observation that price arbitrage models, where the user of the cold storage is the investor himself does indeed work. However, that is not the desired outcome in this instance, in terms of market development and fairness to all stakeholders. However there are cold chain projects based on rental models also and therefore policies should be designed to support both.

- The only way to reduce the business risk of finding the rental space, is to link the investors in the cold storage, be it an outside investor or a commission agent or a joint venture between such entities, to an **anchor customer** who can come forward to take 50 or 67 or 75 or even 100 per cent of the available rental space. It is obvious that this **anchor customer** can only be a large downstream marketer and is most likely to be a large modern retailer or a food processing unit.

- The ***Warehouse Development and Regulatory Authority*** can play an important role by interfacing with cold chain networks so that farmers can either sell for ready cash at the electronic exchange market price or obtain ***Negotiable Warehouse Receipts***, which they can then use to secure financing from the banking system. This will increase the financial flexibility of farmers who are presently compelled to sell for ready cash at a subdued price. The price discovery mechanism must be reinforced by creating electronic exchanges so that at each of these cold chains there is a clearer picture about what the relevant prices are.

- The fact is that most farmers do not have the time or resources to bring their produce on a regular basis to the market place. Therefore, if the farmers have to gain meaningful access on this parallel chain of supply, there has to be an opportunity for the farmer to directly market their produce to the cold chain. One way certainly is the establishment of producer companies/ co-operatives. The other would be to allow private companies to undertake these transactions. However, in both cases certain **institutional changes** are required, which is taken up subsequently.

4.3.2 MARKET LINKAGES

- The linkage to modern retail or food processing sector *via* the **anchor customers** for cold chain is indeed the most powerful means of creating a fair and equitable market where farmers obtain a good price and the consumers do not have to pay an excessively high price.
- Even if this mode of transaction accounts for only a fraction of the total, it has the potential of setting prices across-the-board.
- Alongside this, in the cities there has to be a plan to modernize markets for fresh produce, so that small retailers are also able to enjoy the advantage of scale, efficiency and more transparent markets with wide access to information.
- In this connection, private and co-operative wholesale markets wherever possible, must be encouraged.
- Famers must be given freedom to sell directly to food processing companies, aggregators and retailers in addition to selling in mandis.

4.3.3 INSTITUTIONAL CHANGE

- The most important change that is required in the institutional set up is to liberate perishable farm produce from the restrictions of the APMC. The best way to do this is for State Governments to remove "perishable farm produce" form the aegis of the APMC.
- There have been many references to the Model APMC Act. However, it appears that the Model Act has many of the infirmities in the original APMC Act and is not helpful in developing a framework to modernize the farm logistics for perishable produce. Some States have already made fundamental changes in the APMC legislation.
- Several high powered committees have recommended changes that are consistent with what is being suggested here. State governments should remove "perishable farm produce" from the coverage of the APMC acts. This it is understood can be done by amending the schedule. Some of the committees have suggested that a compensatory mechanism be worked out for the fees that would be lost to the APMC markets. They have also suggested a ceiling of 2 per cent as fees. This seems to be a matter that can readily yield to a satisfactory resolution.
- If such steps are taken, it will be advisable to put in place a regulatory and reporting authority which can create a simple framework for the operation of a cold chain. That would include one-time registration, depositing of fees and a requirement to submit periodic returns on an annual or semi-annual basis.
- It is advisable that such a regulatory agency work closely with the Warehouse Development and Regulatory Authority and other existing regulatory agencies so as to both minimize the creation of a new large and unwieldy set-up and to take advantages of economies of scale through regular exchange of information – especially in regard of transactions, price, volume and identity.

4.3.4 FINANCING AND INCENTIVES

- Cold chains have received some amount of financial support in the form of subsidies. The two recent high powered committees have suggested that (a) the cold chain supply system for horticulture and other fresh farm produce should be treated as infrastructure and (b) that they should qualify for the corresponding financing and tax incentives. This Committee endorses this view.
- Both the Committee of State Agricultural Marketing Ministers as well as the Working Group of Consumer Affairs (chaired by Chief Minister, Gujarat) has recommended that the Public Private Partnership (PPP) model with Viability Gap Funding is an appropriate device to catalyze large scale investments in cold chain.
- This is a good suggestion which this Committee would like to endorse. The Viability Gap Funding model for PPP investments operates on a transparent method of bidding open to technically pre-qualified bidders. However, it would be necessary to work out the details involved and it is not entirely clear that such a model would be workable. However since every cold chain project is in many ways unique it may be difficult to structure a competitive bid. This aspect needs further detailed study so that at least one cold chain project is taken up for viability gap funding. From this experience a firm conclusion can be drawn on how to proceed further in this matter. In the interim, the catalysis of investment in cold chains would have to depend on capital grants and some access to a slightly concessional line of finance.
- There have been suggestions made by the two committees referred to previously to encourage FDI in this sector. Though FDI is permitted in cold-chains to the extent of 100%, through automatic route, for various reasons, inflows have not been significant. There is a need to encourage actual inflows which can be a powerful vehicle of bringing in both capital and logistics technology and expertise. To this end allowing FDI in Multi Brand retail will be a welcome and helpful step.

4.4 Recommendations

The Committee in light of the above discussion recommends the adoption of a four-pronged strategy to drive the establishment of a widespread cold chain logistic system that would benefit both the farmer as well as the consumer, by modernizing and increasing the efficiency of the manner in which perishable farm produce, especially fruit & vegetables travel from the farmer's field to the final consumer's kitchen. The four prongs of this Strategy are:

4.4.1 Economic agents involved

- Visualizing and encouraging both farmer co-operatives/producer companies and private enterprises to establish the cold chain network.
- Private enterprise would include all manner of outside investors – from standalone investors to processing companies and retail chains.

- The policy would actively encourage existing commission agents to set up cold chain facilities.
- FDI in cold chain must be encouraged
- FDI in Multi-brand retail should be permitted to provide a boost for cold chain storage, cold chains and better supplies for food processors.

4.4.2 Market Linkages

- The business model of the cold chain system would expressly **not** be pure price arbitrage – buying cheap at the point of heavy arrivals and holding on till arrivals cease and prices pick up – since that is neither in the interest of the farmer nor the consumer.
- The objective is to first create a facility that smoothens out the episodic and concentrated arrival which is a characteristic of seasonal farm products and the steady & regular demand that exists in the retail market. The result must be to ensure that the farmer receives a good price especially at the peak of the season, and that the consumer buys at a steady price. The return on investment in this cold chain system has to be on a cost-plus basis, not on a price arbitrage model.
- Reduction of wastage, rationalization of margins and larger volumes would generate the economies to sustain the revenue model of the cold chain system.
- It is necessary to reduce the business risk involved in investing in a cold chain system and that can only be achieved by providing a dynamic linkage of the cold chain system to the final retail market. This can be achieved by the tie-up between an **anchor customer** and the investor-provider of the cold chain rental space.
- There must also be scope for **direct marketing** linking the farmer to the cold chain.
- The Warehousing Development and Regulatory Authority can be brought in to link up the cold chains into a network and create conditions where the farmer can obtain Negotiable Warehouse Receipts that he can raise funds on from banks and thereby give him financial flexibility.

4.4.3 Institutional changes needed

- This would need changes in the way APMC legislation works. It is felt that the best way to achieve it would be **remove perishable agricultural produce** from the aegis of the APMC acts.
- Better synergy between the schemes of different Departments/Ministries.

4.4.4 Financing & Incentives

- Two recent high powered committees have suggested that (a) the cold chain supply system for horticulture and other fresh farm produce should be treated as infrastructure and (b) that they should qualify for the corresponding financing and tax incentives. This Committee endorses this view.
- This committee agrees with previous ones that the Public Private Partnership (PPP) model with Viability Gap Funding is an appropriate device to catalyze large scale investments in cold chain.

However, it would be necessary to work out the details involved keeping in mind that each cold chain project is unique.

- In the interim, investment in cold chains would have to depend on capital grants and some access to a slightly concessional line of finance. NABARD has a line of finance for this purpose and this should be fully used.
- The Ministry of Food Processing Industries runs a scheme for capital subsidy of supporting cold chains. This should be a scheme that is on-tap with clearly set out budget limits so that eligible projects within the budgeted limit get the required support. The scheme of subsidy support may be reworked/and sufficient resources provided so that this objective can be achieved.
- Better synergy between the schemes of different Departments/Ministries especially those of Department of Agriculture & Cooperation (DAC) and Ministry of Food Processing Industries (MFPI).
- Given the relative neglect of the non-horticulture cold chains especially those relating to meat, poultry and fishing, State Governments to be actively involved in developing cold chain for these products through their Animal Husbandry & Fisheries Departments.

4.4.5 Action to be taken by various Departments/ Organisations

Based on the broad recommendations indicated above, the Committee has encapsulated the action points for different Departments/ Organisations, categorized into short term (up to 6 months) and medium to long term (beyond six months). These are given in the following Table:-

Sl. No	Organisation/ Department	Short Term Action Points (up to 6 months)	Medium to Long Term Action Points (beyond 6 months)
	ESSENTIAL STEPS		
1	Planning Commission& Department of Agriculture and Cooperation	• Concerted action to ensure that State Governments exempt perishables from the purview of APMC Act, introduce electronic auction platforms and open membership of Mandis on the basis of bank guarantees (for Delhi, Haryana, Maharashtra, Gujarat, H.P., A.P., Karnataka, U.P., M.P., Rajasthan, and others).	• Ensure that gradually all states exempt their perishables from APMC Acts as also reform their agricultural marketing system. • Provision of appropriate plan assistance for strengthening the supply chain network. • Work out bankable schemes/ projects for NABARD/ banking sector.
2	Planning Commission, DIPP and Ministry of Finance	• Facilitate External Commercial Borrowings for strengthening supply chains. • Promote PPP model with Viability Gap Funding. • Model mentioned in the report with an investor in cold chain/ storage with "anchor customer" to be encouraged. • Take necessary steps to ensure that investments in this area receive the tax benefits as applicable for infrastructure sector as announced in the Union Budget 2011-12.	

Sl. No	Organisation/ Department	Short Term Action Points (up to 6 months)	Medium to Long Term Action Points (beyond 6 months)
3	State Governments	• Provide exemption to perishables from the application of APMC Acts. This does not require amendment in the Acts. • Reduce taxes on perishable farm produce sold through APMCs to not more than 2%. • Remove inter-State barriers for movement of perishables. • Open membership of Mandis and replace licensees by traders registered with APMC along with bank guarantees. • Famers must be given freedom to sell directly to food processing companies, aggregators and retailers in addition to selling in mandis. • Bring out policy paper/ user friendly guide for setting up of cold storages in their state.	• Introduction of electronic auction mechanism where daily transactions are in excess of Rs.10 crore. • Encourage private and cooperative wholesale markets. • Introduce a scheme on the lines of Private Entrepreneurs Guarantee (PEG) scheme of FCI so as to facilitate construction of godowns for their own intermediate storage requirements. • Streamline and liberalise policy environment for setting up cold storages. • Set up joint ventures with NDDB to set up Safal like stores. • Promote non-horticulture cold chains especially those relating to meat, poultry and fishing which are relatively neglected. • Simplification of policies/ procedures for change in land use for establishment of storage and handling facilities for horticulture produce. • Assured power supply for cold storages. This is much easier where separation of agriculture feeders has been done. • Encourage buy-in of existing traders.

Sl. No	Organisation/ Department	Short Term Action Points (up to 6 months)	Medium to Long Term Action Points (beyond 6 months)
4	Department of Agriculture and Cooperation	• Encourage setting up of cold storages and private markets/ terminal markets. • Strengthen NCCD and issuance of operational guidelines for NCCD. • Organise awareness campaigns in coordination with other agencies/ organisations/ State Governments. • Organise workshops on PHM and cold chains.	• Strengthen National Vegetable Initiative for Clusters. • Facilitate setting up of electronic exchange platforms for agricultural produce. • Bring out technical/ investment manuals for cold chain projects. • Harmonise the roles and responsibilities of different agencies involved in development of horticulture. • Examine the feasibility and facilitate introduction of newer varieties of vegetables with longer shelf life.
5	Warehousing Development and Regulatory Authority	• Notification of standards developed by NCCD. • Organise awareness campaigns to promote NWR system and registration of cold storages as warehouses.	• Link up cold chains into a network and create conditions where farmer can obtain NWRs and raise funds from banks. • Facilitate setting up electronic exchanges. • Coordination with banking sector.
6	Ministry of Food Processing Industries	• Promote setting up of cold chains. • Take up the matter with Ministry of Finance to make the subsidy scheme for cold chains open ended with higher resources provision. • Improve synergies with schemes of other Ministries particularly DAC.	
	FACILITATING MEASURES		
7	Ministry of Railways/ Concor	• Conduct feasibility studies for introduction of dedicated horticulture trains at select routes in consultation with the Department of Agriculture and Cooperation.	• Introduce dedicated horticulture trains at identified routes.
8	Fresh and Healthy Enterprises Ltd.	• Conduct techno-feasibility studies for extending their activities to more horticulture commodities viz mango, banana, potato, brinjals, carrots, cauliflower, tomato, etc. • Facilitate establishment of world class cold chain infrastructure at identified places and provide logistic solutions to various stakeholders.	
9	Department of Industrial Policy and Promotion/ Ministry of Finance	• Permission for FDI in multi-brand retail. • Encourage actual inflows of FDI into cold chain projects. • Concessional line of finance/ capital grants for encouraging cold storages to continue.	
10	National Dairy Development Board	• Expand 'safal' network to more centres. • Strengthen supply chain network of F&V in coordination with State Governments. • Facilitate setting up electronic exchanges notwithstanding past experiences.	

Sl. No	Organisation/ Department	Short Term Action Points (up to 6 months)	Medium to Long Term Action Points (beyond 6 months)
11	SFAC, NHM and State Govts	• Encourage PPP-IAD projects of corporates with State Government, especially with regard to FPCs, contract farming arrangements, dedicated supply chains for end users/ anchor customers, encouragement for reefer vans and creation of requisite infrastructure for improving shelf life.	
12	NABARD	• Organise seminars in coordination with banks and State Governments on RIDF for cold chain logistics. • Providing financial assistance.	

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Annexure-1

Estimates of Area and Production Total Cereals

State/UT	Area ('000 Hectares)					Production ('000 Tonnes)				
	2006-07	2007-08	2008-09	2009-10	2010-11	2006-07	2007-08	2008-09	2009-10	2010-11
1	2	3	4	5	6	7	8	9	10	11
Andhra Pradesh	5290.0	5274.0	5671.0	4734.0	5898.0	14882.0	17606.0	18973.0	13866.0	18875.0
Arunachal Pradesh	194.3	192.6	195.3	189.7	192.1	237.4	240.2	246.8	299.2	324.6
Assam	2274.0	2405.0	2557.1	2580.3	2640.1	3001.0	3407.0	4078.5	4416.5	4806.4
Bihar	6095.4	6421.0	6334.0	6069.3	5623.5	10660.4	10367.0	11751.6	9678.2	8684.3
Chhattisgarh	4147.3	4168.4	4103.5	4054.8	4094.0	5311.4	5755.1	4668.7	4414.1	6517.7
Goa	53.4	52.5	50.3	47.4	140.2	131.1	122.3	124.1	101.4	402.7
Gujarat	3568.0	3600.0	3279.0	2961.0	3635.0	5906.0	7463.0	5872.0	5244.0	7618.6
Haryana	4181.0	4307.0	4427.3	4408.0	4540.0	14623.0	15206.0	15435.6	15257.0	16471.0
Himachal Pradesh	775.4	778.5	766.4	753.7	761.0	1353.3	1522.1	1377.7	996.5	1379.5
Jammu & Kashmir	879.4	888.3	899.3	905.9	899.5	1558.5	1556.7	1707.1	1300.6	1504.9
Jharkhand	2002.7	2026.4	2047.2	1302.6	1066.6	3428.7	3862.7	3908.0	1928.5	1547.0
Karnataka	5077.0	5488.0	5374.0	5476.0	5447.1	8706.0	10921.0	10303.0	9837.0	12312.2
Kerala	265.0	233.2	237.5	236.9	215.9	632.1	531.3	592.0	600.5	524.2
Madhya Pradesh	7669.1	7262.7	7353.5	7518.9	7701.0	10543.9	9616.9	10231.5	11711.8	11565.9
Maharashtra	9624.0	9151.0	8335.0	8736.7	8991.0	10341.1	12167.7	9771.6	10216.3	12320.6
Manipur	169.2	169.1	172.7	174.2	237.2	394.0	414.6	408.5	331.7	568.5
Meghalaya	124.7	126.7	128.0	128.2	128.2	228.6	228.5	232.4	235.6	235.3
Mizoram	63.5	62.0	61.6	55.7	49.7	50.5	16.4	55.3	55.9	60.8
Nagaland	256.9	267.0	250.9	248.6	264.4	391.2	431.6	474.5	319.5	531.9
Orissa	4612.7	4630.0	4622.5	4538.9	4439.9	6992.9	7759.8	7011.8	7153.7	7192.3
Punjab	6270.0	6274.1	6436.1	6483.0	6489.0	25286.0	26792.1	27308.1	26932.1	27847.0
Rajasthan	9490.4	9737.5	9533.0	9770.9	10314.5	12727.5	14505.9	14853.8	11636.4	15572.6
Sikkim	67.3	68.5	67.0	65.2	63.0	94.2	100.0	95.7	104.4	98.5
Tamil Nadu	2629.6	2487.7	2655.8	2498.1	2537.0	7972.5	6397.3	6937.8	7307.2	7349.0
Tripura	254.5	240.3	245.2	248.2	268.0	624.7	628.6	630.3	643.4	707.2
Uttar Pradesh	17315.3	16928.0	17534.2	16781.3	17355.0	39239.4	40517.9	44731.2	41293.9	45210.6
Uttarakhand	933.0	943.0	965.0	945.0	925.1	1701.0	1746.0	1726.0	1750.0	1763.5
West Bengal	6143.7	6169.7	6352.8	6060.4	5365.0	15820.5	15902.6	16167.1	15591.3	14290.8
A & N Islands	10.7	7.5	8.1	8.3	8.6	30.9	22.8	22.7	25.3	24.3
D & N Haveli	16.4	16.4	16.4	15.2	12.7	27.5	27.5	27.2	16.4	23.8
Delhi	35.9	35.5	35.0	31.4	38.7	122.9	119.2	117.5	125.0	152.5
Daman & Diu	1.8	2.3	3.7	2.3	2.3	3.7	4.0	7.6	3.8	3.7
Pondicherry	24.7	20.6	20.9	21.0	20.1	60.7	53.7	51.0	52.6	52.1
All India	100516.3	100434.5	100739.3	98051.1	100363.1	203084.6	216013.5	219899.7	203445.8	226538.7

Source: Department of Agriculture and Cooperation, Government of India

Annexure-1 (Continued)

Estimates of Yield of Total Cereals

State/UT	Yield (Kg./Hectare)				
	2006-07	2007-08	2008-09	2009-10	2010-11
1	12	13	14	15	16
Andhra Pradesh	2813	3338	3346	2929	3200
Arunachal Pradesh	1222	1247	1264	1577	1690
Assam	1320	1417	1595	1712	1821
Bihar	1749	1615	1855	1595	1544
Chhattisgarh	1281	1381	1138	1089	1592
Goa	2455	2330	2467	2139	2873
Gujarat	1655	2073	1791	1771	2096
Haryana	3497	3531	3486	3461	3628
Himachal Pradesh	1745	1955	1798	1322	1813
Jammu & Kashmir	1772	1752	1898	1436	1673
Jharkhand	1712	1906	1909	1481	1450
Karnataka	1715	1990	1917	1796	2260
Kerala	2385	2278	2493	2534	2428
Madhya Pradesh	1375	1324	1391	1558	1502
Maharashtra	1075	1330	1172	1169	1370
Manipur	2329	2452	2365	1904	2397
Meghalaya	1833	1803	1816	1839	1836
Mizoram	795	265	898	1004	1223
Nagaland	1523	1616	1891	1285	2012
Orissa	1516	1676	1517	1576	1620
Punjab	4033	4270	4243	4154	4291
Rajasthan	1341	1490	1558	1191	1510
Sikkim	1400	1460	1428	1601	1563
Tamil Nadu	3032	2572	2612	2925	2897
Tripura	2455	2616	2571	2592	2639
Uttar Pradesh	2266	2394	2551	2461	2605
Uttarakhand	1823	1852	1789	1852	1906
West Bengal	2575	2578	2545	2573	2664
A & N Islands	2888	3040	2802	3048	2836
D & N Haveli	1677	1677	1659	1078	1867
Delhi	3423	3358	3357	3980	3937
Daman & Diu	2056	1739	2054	1652	1609
Pondicherry	2457	2607	2440	2504	2599
All India	2020	2151	2183	2075	2257

Source: Department of Agriculture and Cooperation, Government of India

Annexure-2

Estimates of Area and Production of Total Foodgrains

State/UT	Area ('000 Hectares)					Production ('000 Tonnes)				
	2006-07	2007-08	2008-09	2009-10	2010-11	2006-07	2007-08	2008-09	2009-10	2010-11
1	2	3	4	5	6	7	8	9	10	11
Andhra Pradesh	7274.0	7387.0	7442.0	6666.0	8029.8	16229.0	19303.0	20421.0	15295.0	20315.0
Arunachal Pradesh	202.0	200.3	203.8	198.6	200.7	245.7	248.5	255.8	308.9	333.7
Assam	2380.0	2518.0	2670.8	2695.6	2766.5	3060.0	3470.0	4143.0	4481.1	4876.5
Bihar	6702.4	7028.6	6919.7	6634.2	6235.9	11098.6	10864.1	12220.7	10150.7	9222.0
Chhattisgarh	5056.0	5084.0	4963.3	4863.7	4955.4	5805.0	6291.9	5167.3	4902.8	7055.2
Goa	65.4	63.9	60.2	55.3	147.7	147.4	133.6	134.3	109.9	410.7
Gujarat	4568.0	4481.0	4063.0	3694.0	4525.0	6499.0	8206.0	6481.0	5761.0	8341.6
Haryana	4351.0	4476.0	4610.2	4541.7	4716.4	14763.0	15307.8	15613.4	15357.5	16629.5
Himachal Pradesh	806.4	812.4	797.4	784.1	795.3	1382.2	1558.1	1401.2	1017.2	1421.1
Jammu & Kashmir	907.5	918.6	929.9	935.6	928.1	1572.7	1572.1	1721.3	1314.2	1521.6
Jharkhand	2379.1	2436.4	2434.8	1635.3	1492.8	3686.8	4164.5	4188.7	2161.4	1876.6
Karnataka	7446.0	7871.0	7461.0	7955.0	8239.1	9599.0	12186.0	11275.0	10955.0	13877.2
Kerala	274.8	243.0	245.2	247.3	219.7	640.5	539.7	598.3	610.8	527.2
Madhya Pradesh	11777.2	11288.9	11913.3	12459.4	12862.8	13747.0	12070.5	13914.6	16016.4	14952.1
Maharashtra	13452.0	13207.0	11417.0	12190.3	13029.0	12645.1	15191.7	11427.6	12614.9	15420.4
Manipur	177.8	183.6	185.6	188.7	264.1	398.5	421.8	415.0	338.9	592.7
Meghalaya	128.6	130.7	132.5	132.2	132.6	231.5	231.8	236.3	239.2	239.0
Mizoram	68.5	67.1	65.6	59.6	53.6	56.3	19.1	58.9	62.4	66.8
Nagaland	294.4	302.0	283.9	282.1	298.8	436.2	473.2	514.2	354.2	568.3
Orissa	5403.7	5489.0	5427.4	5406.2	5318.9	7344.7	8143.3	7399.1	7553.0	7619.3
Punjab	6301.9	6302.7	6460.0	6503.3	6510.2	25313.1	26815.1	27329.8	26950.3	27866.3
Rajasthan	12698.0	13607.4	13205.5	13271.9	15069.3	14208.8	16058.7	16680.2	12350.1	18832.2
Sikkim	74.1	81.0	79.6	78.4	76.2	100.3	111.6	107.5	117.3	110.3
Tamil Nadu	3166.1	3097.5	3191.9	3032.8	3173.8	8263.0	6582.3	7102.3	7511.3	7594.9
Tripura	262.6	247.1	251.3	254.6	275.4	630.0	633.3	634.7	647.9	712.4
Uttar Pradesh	20039.6	19084.0	19757.5	19322.0	19804.0	41214.5	42094.8	46729.3	43195.3	47247.6
Uttarakhand	986.0	1006.0	1029.0	1009.0	986.3	1735.0	1796.0	1765.0	1796.0	1815.6
West Bengal	6362.8	6355.8	6535.4	6242.3	5561.2	15974.5	16050.2	16295.6	15741.4	14466.9
A & N Islands	11.4	9.7	10.2	11.2	11.2	31.3	24.1	23.9	27.1	25.4
D & N Haveli	22.9	22.9	22.8	21.2	19.5	33.1	33.1	32.7	21.3	29.8
Delhi	36.3	35.9	35.3	31.8	39.2	123.6	119.9	118.2	125.8	153.3
Daman & Diu	3.1	3.6	5.0	3.6	3.6	4.8	5.1	8.7	4.9	4.8
Pondicherry	28.4	25.4	23.4	23.1	22.7	61.9	54.1	51.5	52.9	53.5
All India	123708.0	124067.5	122833.5	121429.7	126764.8	217282.1	230775.0	234466.0	218145.9	244779.7

Source: Department of Agriculture and Cooperation, Government of India

Annexure-2 (Contd..)

Estimates of Yield of Total Foodgrains

State/UT	Yield (Kg./Hectare)				
	2006-07	2007-08	2008-09	2009-10	2010-11
1	12	13	14	15	16
Andhra Pradesh	2231	2613	2744	2294	2530
Arunachal Pradesh	1216	1241	1255	1555	1663
Assam	1286	1378	1551	1662	1763
Bihar	1656	1546	1766	1530	1479
Chhattisgarh	1148	1238	1041	1008	1424
Goa	2254	2091	2231	1989	2780
Gujarat	1423	1831	1595	1560	1843
Haryana	3393	3420	3387	3381	3526
Himachal Pradesh	1714	1918	1757	1297	1787
Jammu & Kashmir	1733	1711	1851	1405	1639
Jharkhand	1550	1709	1720	1322	1257
Karnataka	1289	1548	1511	1377	1684
Kerala	2331	2221	2440	2470	2399
Madhya Pradesh	1167	1069	1168	1285	1162
Maharashtra	940	1150	1001	1035	1184
Manipur	2241	2297	2236	1796	2244
Meghalaya	1800	1774	1783	1809	1803
Mizoram	822	285	898	1047	1246
Nagaland	1482	1567	1811	1256	1902
Orissa	1359	1484	1363	1397	1432
Punjab	4017	4255	4231	4144	4280
Rajasthan	1119	1180	1263	931	1250
Sikkim	1354	1378	1351	1496	1448
Tamil Nadu	2610	2125	2225	2477	2393
Tripura	2399	2563	2526	2545	2587
Uttar Pradesh	2057	2206	2365	2236	2386
Uttarakhand	1760	1785	1715	1780	1841
West Bengal	2511	2525	2493	2522	2601
A & N Islands	2746	2489	2343	2408	2277
D & N Haveli	1445	1445	1434	1008	1530
Delhi	3405	3340	3348	3955	3909
Daman & Diu	1548	1417	1740	1361	1333
Pondicherry	2180	2130	2201	2295	2354
All India	1756	1860	1909	1796	1931

Source: Department of Agriculture and Cooperation, Government of India

Annexure-3

Area and Production of Horticulture Crops

As on 31/01/2012

Area in Ha '000'
Production in MT '000'

Crops	2008-09		2009-10		2010-11 (Final)		2011-12 (P)	
	Area	Production	Area	Production	Area	Production	Area	Production
Fruits								
Almond					23	14	32	4
Aonla					67	677	69	696
Apple	274	1985	283	1777	289	2891	297	2175
Banana	709	26217	770	26470	830	29780	856	29287
Ber					22	188	35	338
Citrus								
(i) Lime/Lemon					*219*	*2108*	*226*	*2228*
(ii) Mandarin					*324*	*3255*	*341*	*3524*
(iii) Sweet Orange(Mosambi)					*157*	*1316*	*159*	*1625*
(iv) Others					*147*	*784*	*152*	*804*
Citrus Total (i to iv)	**924**	**8623**	**987**	**9638**	**846**	**7464**	**878**	**8181**
Custardapple					15	105	16	108
Grapes	80	1878	106	881	111	1235	119	2784
Guava	204	2270	220	2572	205	2462	213	2620
Jackfruit					36	540	36	540
Kiwi					0	1	0	3
Litchi	72	423	74	483	78	497	79	521
Mango	2309	12750	2312	15027	2297	15188	2366	16021
Papaya	98	3629	96	3913	106	4196	107	4296
Peach					18	92	18	86
Pear					41	300	42	214
Pecanut					1	0	1	0
Pineapple	84	1341	92	1387	89	1415	90	1439
Plum					14	32	14	54
Pomegranate	109	807	125	820	107	743	108	912
Sapota	156	1308	159	1347	160	1424	165	1444
Walnut					114	187	*107*	*232*
Others	1083	7234	1105	7201	912	5446	929	5571
Total Fruits	**6102**	**68465**	**6329**	**71516**	**6383**	**74878**	**6578**	**77525**
Vegetables								
Beans					100	888	104	942
Bitterguard					68	749	69	762
Bottleguard					75	1354	76	1367
Brinjal	600	10378	607	10372	680	11896	684	12214
Cabbage	310	6870	331	7281	369	7949	377	8171
Capsicum					6	65	6	68
Carrot					56	953	60	1011
Cauliflower	349	6532	348	6569	369	6745	374	7026
Cucumber					35	525	36	539
Muskmelon					40	740	40	757
Okra	432	4528	452	4803	498	5784	506	5912
Onion	834	13565	756	12159	1064	15118	1042	15748
Parmal(pointed gourd)					0	0	0	0
Peas	348	2916	365	3029	370	3517	383	3712
Potato	1828	34391	1835	36577	1863	42339	1911	43645
Radish					133	1878	133	1911
Sitaphal/Pumpkin					5	143	5	148
Sweet Potato	124	1120	119	1095	113	1047	116	1076
Tapioca	280	9623	232	8060	221	8076	227	8749
Tomato	599	11149	634	12433	865	16826	881	17459
Watermelon					67	1436	69	1481
Others	2275	28006	2332	31724	1496	18526	1489	16908
Total	**7979**	**129078**	**8012**	**134104**	**8495**	**146554**	**8588**	**149607**
Aromatic	430	430	509	573	510	605	514	657
Flowers Cut*		47942		66671		69027		69027
Flowers Loose	167	987	183	1021	191	1031	191	1031
Plantation Crops								
Arecanut	387	481	400	478	400	478	407	497
Cashewnut	893	695	930	632	953	675	946	732
Cocoa	34	12	46	13	57	14	58	18
Coconut	1903	10148	1895	10824	1896	10840	1941	11747
Total	**3217**	**11336**	**3272**	**11947**	**3306**	**12007**	**3352**	**12993**
Spices								
Ajwan			17	10	26	22	28	24
Cardamom			90	16	87	16	88	16
Chillies (Dried)			767	1203	792	1223	792	1260
Cinnamon/Tejpata			4	9	3	5	3	5
Celery,Dill & Poppy			19	13	38	40	40	44
Clove			3	1	2	1	3	1
Coriander			360	237	530	482	562	530
Cumin			377	156	508	314	513	343
F.Greek			51	57	81	118	83	125
Fennel			43	57	62	105	68	116
Garlic			165	834	201	1058	219	1164
Ginger			108	385	149	702	158	772
Nutmeg			16	8	16	11	17	13
Pepper			196	51	184	52	188	42
Vanilla			9	0	7	1	7	1
Tamarind			58	185	60	206	60	208
Turmeric			181	793	195	993	199	1062
Spice Total	**2629**	**4145**	**2464**	**4016**	**2940**	**5350**	**3027**	**5726**
Total	**20525**	**214442**	**20767**	**223177**	**21824**	**240426**	**22251**	**247540**

P = Provisional
Source: Department of Agriculture and Cooperation

Annexure-4

State-Wise Production and Area of Fruits

State/Uts	Area (in 000'HA)							Prodcution (in 000'MT)						
	1991-92	2001-02	2007-08	2008-09	2009-10	2010-11	2011-12	1991-92	2001-02	2007-08	2008-09	2009-10	2010-11	2011-12
UTTAR PRADESH	303.2	288.3	315.8	346.3	356.7	324.8	331.3	2449.8	2282.8	3932.6	4439.6	5380.1	5368.4	5582.3
WEST BENGAL	111.3	147.6	194.4	203.2	208.3	211.6	216.6	1131.7	1985.5	2766.6	2775.6	2861	2952.8	3065.6
BIHAR	266.9	272.3	286.3	290.7	293.6	296.4	296.4	2799.2	2877	3252.4	3722.8	3464.9	3911.8	3911.8
ORISSA	136.3	225	265.2	285.8	302.1	320.7	331.8	978	1362.9	1275.1	1532.8	1845.1	2048.3	2094.1
TAMIL NADU	136.2	227.5	292.5	318.6	291.6	321.8	332.1	2316.1	4342.4	7530.1	8207.7	6379	9965	8535.1
GUJARAT	84.5	149	306.9	316.8	352.9	349.9	361.8	1828.9	2346.9	5849.7	5822.3	6985.1	7245	7373
KARNATAKA	209.3	257.1	299.9	315.4	351	377.8	398	3191.8	4028.9	5000.6	5269.8	5712.4	6273.6	6616.4
MAHARASHTRA	256.1	582.8	1432.3	1432.3	1540.6	1537	1560	3518.4	8840.6	11047.6	10924.8	10396.6	9513	12035
ANDHRA PRA	313.1	575.8	889.4	935.9	921.1	646.1	675.5	4008.2	6157.4	12214.4	11407	12918.3	9417	9841.1
ASSAM	72.3	110.8	122.7	105.2	117.3	137.5	140.2	886.4	1335.1	1410.7	1574.8	1575.5	1763.5	1806.7
HARYANA	13.9	31.3	33.5	37.6	41.5	46.3	51.3	110	235.2	240.4	263.9	303.9	356.6	400
CHHATTISGARH		14.4	107.7	111.7	125.3	177	191.6		203.1	915.1	965.7	1185.9	1569.6	1710.8
PUNJAB	72.7	37.5	61.6	64.8	67.6	69.8	73.8	663.8	531.7	1055.5	1182.9	1365.1	1373.2	1468.2
KERALA	236.3	234.5	323.3	320.8	296.7	301.3	298.9	1101.3	1772.6	2579.8	2558.9	2398.3	2508.3	2432
JHARKHAND		31.5	37.6	72	37.7	72	93		321.1	352	395.9	577.6	779.6	888
MADHYA PRA	64.7	46.6	46.6	92.4	113.1	132.3	154.9	1245	1143.8	1237.1	2372.5	2864	3373.5	3947.1
HIMACHAL PRA	157.2	223	202.4	193.3	208.4	214.8	214	339.9	263.4	713	624.7	382.7	1031.1	349.1
J & K	119.1	142.2	194.9	205.1	209.8	325.6	334.9	700.8	1000.9	1435.8	1538.1	1534.7	2220.5	2155.6
RAJASTHAN	22.8	22.1	41.6	30.6	32.1	51.1	51.1	113.6	200.7	421.8	484.7	676.5	695.1	695.1
UTTRAKHAND	150.5	197.5	171.3	171.7	193.8	179.3	179.3	428.7	376.1	717.8	725.3	723.6	718.9	718.9
DELHI	0.1	0.1	0.06	0.06	0.1	0.1	0.1	0.7	1	0.99	0.99	1	1	1
TRIPURA	44.9	28.3	33.9	36.5	36.9	40.8	40.5	319.1	452.1	525.7	477.2	573.8	643.9	624.6
MEGHALAYA	24.2	24	28.5	32.9	32.9	30.2	30.2	218.1	186.9	235.3	294.8	294.8	241.9	241.9
MANIPUR	19.8	26.1	39.1	42.4	38.4	68.7	68.7	43	134	273.7	341.9	281.9	286.3	286.3
MIZORAM	9.3	19	33.3	34.1	27.1	27	28.3	34.8	63.4	203.4	123.1	328.3	211.5	333.6
SIKKIM	7.7	12.3	9.3	10.5	12.2	17.5	18.6	18.8	10.3	13.9	15.7	18.5	25.8	27.9
PONDICHERRY	1	1.1	1.7	1.2	1.2	0.8	0.7	19.7	24	52	27.9	27.9	13.6	15.8
NAGALAND	5.2	25	11.8	18.2	30.8	18.2	18.2	9.2	302	53	151.3	223.7	151.3	151.3
GOA	11	10.7	11	11.9	11	11	11	84.2	64.7	97.8	88.1	78.4	78.6	78.6
ANDAMAN & NICOBAR	3.3	3.7	3	3	3.1	3.1	3.2	12.9	16.7	22.5	24.9	26.8	28.7	28.6
ARUNACHAL PRA	20.2	41.6	57.6	57.6	72	72	72	47.3	124.9	108	108	107.9	107.9	107.9
LAKSHADWEEP	0.3	0.3	0.35	0.35	0.4	0.4	0.4	0.5	1.1	1.24	1.24	1.2	1.2	1.2
DADRA & NAGAR HAVELI	0.7	0.7	1.8	1.8	1.8	0	0	7.1	7.1	19.7	19.7	19.7	0	0
CHANDIGARH	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.9	1.1	1.1	1.1	1.1	1.1	0.1
DAMAN & DIU	0.3	0.4	0.02	0.02	0	0	0	3.1	3.4	0.02	0.02	0.02	0	0
Total	**2874.5**	**4010.2**	**5857.2**	**6100.9**	**6329.2**	**6383**	**6578.5**	**28632**	**43000.8**	**65556.45**	**68465.75**	**71515.32**	**74877.6**	**77524.7**

Source: Department of Agriculture and Cooperation, Government of India

Annexure-4 (Continued)

State-Wise Productivity of Fruits							
State/Uts	Productivity (in MT/HA)						
	1991-92	2001-02	2007-08	2008-09	2009-10	2010-11	2011-12
UTTAR PRADESH	8.1	7.9	12.5	12.8	15.1	16.5	16.8
WEST BENGAL	10.2	13.5	14.2	13.7	13.7	14.0	14.2
BIHAR	10.5	10.6	11.4	12.8	11.8	13.2	13.2
ORISSA	7.2	6.1	4.8	5.4	6.1	6.4	6.3
TAMIL NADU	17.0	19.1	25.7	25.8	21.9	31.0	25.7
GUJARAT	21.6	15.8	19.1	18.4	19.8	20.7	20.4
KARNATAKA	15.2	15.7	16.7	16.7	16.3	16.6	16.6
MAHARASHTRA	13.7	15.2	7.7	7.6	6.7	6.2	7.7
ANDHRA PRA	12.8	10.7	13.7	12.2	14.0	14.6	14.6
ASSAM	12.3	12.0	11.5	15.0	13.4	12.8	12.9
HARYANA	7.9	7.5	7.2	7.0	7.3	7.7	7.8
CHHATTISGARH		14.1	8.5	8.6	9.5	8.9	8.9
PUNJAB	9.1	14.2	17.1	18.3	20.2	19.7	19.9
KERALA	4.7	7.6	8.0	8.0	8.1	8.3	8.1
JHARKHAND		10.2	9.4	5.5	15.3	10.8	9.5
MADHYA PRA	19.2	24.5	26.5	25.7	25.3	25.5	25.5
HIMACHAL PRA	2.2	1.2	3.5	3.2	1.8	4.8	1.6
J & K	5.9	7.0	7.4	7.5	7.3	6.8	6.4
RAJASTHAN	5.0	9.1	10.1	15.8	21.1	13.6	13.6
UTTRAKHAND	2.8	1.9	4.2	4.2	3.7	4.0	4.0
DELHI	7.0	10.0	16.5	16.5	10.0	10.0	10.0
TRIPURA	7.1	16.0	15.5	13.1	15.6	15.8	15.4
MEGHALAYA	9.0	7.8	8.3	9.0	9.0	8.0	8.0
MANIPUR	2.2	5.1	7.0	8.1	7.3	4.2	4.2
MIZORAM	3.7	3.3	6.1	3.6	12.1	7.8	11.8
SIKKIM	2.4	0.8	1.5	1.5	1.5	1.5	1.5
PONDICHERRY	19.7	21.8	30.6	23.3	23.3	17.0	22.6
NAGALAND	1.8	12.1	4.5	8.3	7.3	8.3	8.3
GOA	7.7	6.0	8.9	7.4	7.1	7.1	7.1
ANDAMAN & NICOBAR	3.9	4.5	7.5	8.3	8.6	9.3	8.9
ARUNACHAL PRA	2.3	3.0	1.9	1.9	1.5	1.5	1.5
LAKSHADWEEP	1.7	3.7	3.5	3.5	3.0	3.0	3.0
DADRA & NAGAR HAVELI	10.1	10.1	10.9	10.9	10.9		
CHANDIGARH	19.0	11.0	11.0	11.0	11.0	11.0	1.0
DAMAN & DIU	10.3	8.5	1.0	1.0			

Source: Department of Agriculture and Cooperation, Government of India

Annexure-5

State-Wise Production and Area of Vegetables														
State/Uts	Area (in 000'HA)							Prodcution (in 000'MT)						
	1991-92	2001-02	2007-08	2008-09	2009-10	2010-11	2011-12	1991-92	2001-02	2007-08	2008-09	2009-10	2010-11	2011-12
UTTAR PRADESH	576.7	777.9	960.8	987.8	1020.1	829.4	846.0	9627.0	15045.0	19790.3	18950.1	22435.7	17679.4	18382.2
WEST BENGAL	456	1139	1313.1	1323.6	1302.7	1349.7	1360.5	4680.0	18075.0	22456.8	22704.3	21906.5	26725.5	27135.0
BIHAR	843.3	578.9	823.8	826.9	836	845.0	845.0	8643.0	8023.0	14067.8	13385.7	13906.8	14630.2	14630.2
ORISSA	710.3	643.4	660.8	672.5	694.2	553.8	568.5	7275.0	7447.0	8214.8	8467.4	8963.6	7790.1	7973.0
TAMIL NADU	889.3	213.8	262.7	286.3	263.7	277.3	286.5	3797.0	5445.0	7975.7	8693.5	7627.7	8279.9	8976.1
GUJARAT	114.6	232.2	411.7	394.8	406.8	515.9	481.2	1668.0	3278.0	7403.0	6807.1	7255.5	9379.5	9133.5
KARNATAKA	351.1	358.1	427.4	448	441.2	466.3	488.2	3673.0	4173.0	7367.1	7724.9	7082.2	9056.4	7833.5
MAHARASHTRA	241.1	402.4	455.3	448.3	461.9	611.0	546.0	4171.0	5128.0	6454.9	6368.0	6331.2	7504.0	8166.0
ANDHRA PRADESH	155.2	222.5	298.9	324.6	331.3	651.2	661.0	1453.0	2587.0	4946.3	5267.5	5426.2	11847.6	12025.3
ASSAM	222.4	237.4	328.9	240.1	255.2	260.1	265.8	2132.0	2935.0	4474.2	2916.7	4569.9	2925.5	3045.2
HARYANA	60.8	150.4	274.5	298.4	300.9	346.4	345.0	877.0	2152.0	3277.1	3893.4	3987.0	4649.3	4800.0
CHHATTISGARH		104.1	292.6	302.6	315.4	345.8	350.6		1355.0	2934.2	3041.0	3601.1	4248.8	4424.7
PUNJAB	84.5	135	171.6	178.4	183.3	174.1	192.6	1450.0	2276.0	2772.1	3410.3	3522.5	3585.8	3718.9
KERALA	202.1	114.3	166.9	163.6	151.6	149.5	149.1	3229.0	2542.0	3479.0	3509.4	3518.1	3392.7	3626.0
JHARKHAND		158.5	238.8	242.1	228.9	259.5	263.3		1736.0	3639.7	3637.0	3676.9	4112.4	3933.9
MADHYA PR	176.4	136.4	209.4	291.7	250.7	283.7	360.6	2221.0	1818.0	2919.7	4105.8	3112.6	3698.6	4701.5
HIMACHAL PR	38.7	34.6	63.8	74.7	79.8	80.4	81.7	476.0	639.1	1150.7	1263.9	1390.7	1474.9	1511.4
J & K	180.3	50.8	58.6	60.7	69.8	69.7	68.7	745.0	728.9	1238.3	1023.6	1374.2	1559.1	1568.3
RAJASTHAN	62.9	99.3	143.1	125.6	131.9	140.3	140.3	307.0	432.5	853.3	736.7	1071.9	885.0	885.0
UTTARAKHAND	57.1	93.8	80.5	81.8	82.6	85.8	85.8	617.6	737.3	1036.2	1077.6	997.3	1030.9	1030.9
DELHI	55	111	42.7	36.1	36.1	29.8	30.0	627.8	747.4	595.6	617.4	617.4	496.8	488.3
TRIPURA	30.3	31.3	33.7	25.6	32.5	36.0	36.0	306.8	353.2	423.6	294.7	446.9	532.3	532.3
MEGHALAYA	25.9	35.7	42.5	44.3	44.3	41.8	41.8	219.2	265.9	352.5	415.8	415.8	356.5	356.5
MANIPUR	11.8	10.6	12.1	16.6	19.9	22.2	22.2	50.3	66.1	113.7	174.3	221.8	236.5	236.5
MIZORAM	6	6.8	3	14.4	10.6	17.5	18.8	31.8	44.1	51.9	114.4	179.1	115.6	126.1
SIKKIM	7.6	14.2	20.1	21.5	28.7	23.9	24.6	46.1	60.0	95.9	98.0	147.7	120.9	124.5
PONDICHERRY	2.3	3.7	2.7	4.5	4.5	0.6	0.6	22.3	54.2	54.7	81.0	81.0	8.8	9.0
NAGALAND	8.2	26.3	10.4	10.4	10.4	10.7	10.7	66.9	286.0	63.5	78.3	78.3	79.4	79.4
GOA		7.6	8.5	5.7	5.7	5.7	5.7		76.0	85.0	57.6	57.8	57.8	57.8
A & N	3.4	3.1	4	4	5.2	5.7	5.8	13.2	15.8	30.8	30.8	41.5	34.5	35.9
ARUNACHAL PR	17.1	20.8	23.8	23.8	4.2	4.2	4.2	79.9	83.9	110.0	110.0	38.5	38.5	38.5
LAKSHADWEEP	0.4	0.2	0.4	0.4	0.4	0.4	0.4	0.4	0.2	14.1	14.1	14.1	14.1	14.1
DADRA & NAGAR HA	1.5	1.5	1	1	1	1.1	1.1	13.6	13.5	4.5	4.5	4.5	5.5	5.5
CHANDIGARH	0.3	0.1	0.1	0.1	0.1	0.1	0.1	11.1	1.7	1.7	1.7	1.7	1.7	1.7
DAMAN & DIU	0.1	0.1	0.2	0.2	0.2	0.0	0.0	0.3	1.1	0.2	0.2	0.2	0.0	0.0
Total	**5592.7**	**6155.8**	**7848.4**	**7981.1**	**8011.8**	**8494.6**	**8588.4**	**58531.3**	**88621.9**	**128449**	**129077**	**134104**	**146555**	**149607**

Source: Department of Agriculture and Cooperation, Government of India

Annexure-5 (Continued)

State-Wise Productivity of Vegetables							
State/Uts	**Productivity (in MT/HA)**						
	1991-92	2001-02	2007-08	2008-09	2009-10	2010-11	2011-12
UTTAR PRADESH	16.7	19.3	20.6	19.2	22.0	21.3	21.7
WEST BENGAL	10.3	15.9	17.1	17.2	16.8	19.8	19.9
BIHAR	10.2	13.9	17.1	16.2	16.6	17.3	17.3
ORISSA	10.2	11.6	12.4	12.6	12.9	14.1	14.0
TAMIL NADU	4.3	25.5	30.4	30.4	28.9	29.9	31.3
GUJARAT	14.6	14.1	18.0	17.2	17.8	18.2	19.0
KARNATAKA	10.5	11.7	17.2	17.2	16.1	19.4	16.0
MAHARASHTRA	17.3	12.7	14.2	14.2	13.7	12.3	15.0
ANDHRA PRADESH	9.4	11.6	16.5	16.2	16.4	18.2	18.2
ASSAM	9.6	12.4	13.6	12.1	17.9	11.2	11.5
HARYANA	14.4	14.3	11.9	13.0	13.3	13.4	13.9
CHHATTISGARH		13.0	10.0	10.0	11.4	12.3	12.6
PUNJAB	17.2	16.9	16.2	19.1	19.2	20.6	19.3
KERALA	16.0	22.2	20.8	21.5	23.2	22.7	24.3
JHARKHAND		11.0	15.2	15.0	16.1	15.8	14.9
MADHYA PR	12.6	13.3	13.9	14.1	12.4	13.0	13.0
HIMACHAL PR	12.3	18.5	18.0	16.9	17.4	18.3	18.5
J & K	4.1	14.3	21.1	16.9	19.7	22.4	22.8
RAJASTHAN	4.9	4.4	6.0	5.9	8.1	6.3	6.3
UTTARAKHAND	10.8	7.9	12.9	13.2	12.1	12.0	12.0
DELHI	11.4	6.7	13.9	17.1	17.1	16.7	16.3
TRIPURA	10.1	11.3	12.6	11.5	13.8	14.8	14.8
MEGHALAYA	8.5	7.4	8.3	9.4	9.4	8.5	8.5
MANIPUR	4.3	6.2	9.4	10.5	11.1	10.7	10.7
MIZORAM	5.3	6.5	17.3	7.9	16.9	6.6	6.7
SIKKIM	6.1	4.2	4.8	4.6	5.1	5.1	5.1
PONDICHERRY	9.7	14.6	20.3	18.0	18.0	14.7	15.0
NAGALAND	8.2	10.9	6.1	7.5	7.5	7.4	7.4
GOA		10.0	10.0	10.1	10.1	10.1	10.1
A & N	3.9	5.1	7.7	7.7	8.0	6.1	6.2
ARUNACHAL PR	4.7	4.0	4.6	4.6	9.2	9.2	9.2
LAKSHADWEEP	1.0	1.0	35.3	35.3	35.3	35.3	35.3
DADRA & NAGAR HA	9.1	9.0	4.5	4.5	4.5	5.0	5.0
CHANDIGARH	37.0	17.0	17.0	17.0	17.0	17.0	17.0
DAMAN & DIU	3.0	11.0	1.0	1.0	1.0		
Total	**10.5**	**14.4**	**16.4**	**16.2**	**16.7**	**17.3**	**17.4**

Source: Department of Agriculture and Cooperation, Government of India

Annexure-6

All-India Productivity of Horticultural Crops (in MT/HA)

Year	Fruits	Vegetables	Plantation Crops	Total Horticultural Crops
1991-92	10.0	10.5	3.3	7.5
2001-02	10.7	14.4	3.3	8.8
2002-03	11.9	13.9	3.3	8.9
2003-04	9.9	14.5	4.2	8.0
2004-05	10.1	15.0	3.1	9.1
2005-06	10.4	15.4	3.4	9.8
2006-07	10.7	15.2	3.7	9.9
2007-08	11.2	16.4	3.5	10.5
2008-09	11.2	16.2	3.5	10.4
2009-10	11.3	16.7	3.7	10.7
2010-11	11.7	17.3	3.6	11.0
2011-12	11.8	17.4	3.9	11.1

Source: Horticulture Division, M/o Agriculture

Annexure-7

Storage Capacity for Central Pool stocks as on 30.11.2011 (in lakh tonnes)

State	Total Storage Capacity with FCI (Owned/Hired)							Total Storage Capacity with State Agencies			Grand Total (FCI+STATES)
								(Excluding Capacities given to FCI)*			
	Covered			Covered and Plinth (CAP)			TOTAL (FCI)	Covered	CAP	Total	
	Owned	Hired	Total Covered	Owned	Hired	Total CAP					
Andhra Pradesh	12.73	31.92	44.65	2.62	0	2.62	47.27	11.55	0	11.55	58.82
(Including A&N)										0	0
Arunachal Pradesh	0.18	0.04	0.22	0	0	0	0.22	0.05	0	0.05	0.27
Assam	2.07	0.7	2.77	0	0	0	2.77	0.41	0	0.41	3.18
Bihar	3.66	2.42	6.08	1	0	1	7.08	6.96	0	6.96	14.04
Chhattisgarh	5.12	3.99	9.11	0	0	0	9.11	10.24	0	10.24	19.35
Delhi	3.36	0	3.36	0.31	0	0.31	3.67	0	0	0	3.67
Gujarat	5	1.99	6.99	0.27	0	0.27	7.26	3.92	0	3.92	11.18
Haryana	7.68	15.65	23.33	3.33	0.19	3.52	26.85	23.03	45.08	68.11	94.96
Himachal Pradesh	0.14	0.12	0.26	0	0	0	0.26	0	0	0	0.26
J&K	1.03	0.18	1.21	0.1	0	0.1	1.31	1.26	0	1.26	2.57
Jharkhand	0.66	0.69	1.35	0.05	0	0.05	1.4	0.08	0	0.08	1.48
Karnataka	3.81	3.45	7.26	1.36	0	1.36	8.62	2.17	0	2.17	10.79
Kerala	5.17	0	5.17	0.2	0	0.2	5.37	0	0	0	5.37
Madhya Pradesh	3.37	3.35	6.72	0.36	0	0.36	7.08	31.35	0	31.35	38.43
Maharashtra	12.05	8.49	20.54	1.02	0.1	1.12	21.66	18.35	0	18.35	40.01
(Including goa)		0	0	0		0	0			0	0
Manipur	0.2	0.01	0.21	0	0	0	0.21	0.2	0	0.2	0.41
Meghalaya	0.14	0.12	0.26	0	0	0	0.26	0	0	0	0.26
Mizoram	0.25	0.01	0.26	0	0	0	0.26	0.56	0	0.56	0.82
Nagaland	0.2	0.13	0.33	0	0	0	0.33	0.07	0	0.07	0.4
Orissa	3.02	3	6.02	0	0	0	6.02	3.64	0	3.64	9.66
Punjab	22.24	51.35	73.59	7.31	3.2	10.51	84.1	23.88	92.7	116.58	200.68
(including Chandigarh)										0	0
Rajasthan	7.06	8.76	15.82	1.85	4.08	5.93	21.75	0	0	0	21.75
Tamil Nadu	6.24	3.9	10.14	0.67	0	0.67	10.81	6.5	0	6.5	17.31
(Including										0	0
Tripura	0.29	0.19	0.48	0	0	0	0.48	0.4	0	0.4	0.88
Uttar Pradesh	14.95	25.59	40.54	5.19	0.25	5.44	45.98	4.11	0	4.11	50.09
Uttrakhand	0.66	1.26	1.92	0.21	0.04	0.25	2.17	0.91	0	0.91	3.08
West Bengal	8.69	2.06	10.75	0.51	0	0.51	11.26	3.9	0	3.9	15.16
(including Sikkim)				0							
Total	**129.97**	**169.37**	**299.34**	**26.36**	**7.86**	**34.22**	**333.56**	**153.54**	**137.78**	**291.32**	**624.88**

* Capacity with State Agencies as on 31.3.2011

** Source: as furnished by EDs (Zone), FCI

Annexure-8

Statewise distribution of cold storages as on 31/03/2011			
S. No.	IState/UT	Total No.	Total Capacity in MTs
		No.	capacity
Northern Region			
1	Delhi	95	126158
2	Jammu & Kashmir	20	48069
3	Haryana	248	398904
4	Himachal Pradesh	18	19858
5	Punjab	504	1679218
6	Chandigarh (UT)	6	12216
7	Uttar Pradesh	1988	12594486
8	Uttrakhand	16	70899
	Sub-Total	**2895**	**14949808**
Eastern/ North Eastern Region			
9	Assam	27	102979
10	Bihar	290	1354807
11	Jharkhand	51	197874
12	Orissa	104	301139
13	West Bengal	484	5811806
14	Manipur	0	0
15	Meghalaya	3	3200
16	Mizoram	1	3471
17	Nagaland	2	6150
18	Sikkim	1	2000
19	Tripura	12	33581
	Sub-Total	**975**	**7817007**
Central Region			
20	Chhattisgarh	75	371939
21	Madhya Pradesh	223	940679
22	Rajasthan	132	404585
	Sub-Total	**430**	**1717203**
Western Region			
23	Maharashtra	484	592308
24	Gujarat	477	1650684
25	Goa	29	7705
	Sub-Total	**990**	**2250697**
Southern Region			
26	A&N Island (UT)	2	210
27	Andhra Pradesh	331	1131807
28	Arunachal Pradesh	1	5000
29	Kerala	193	58105
30	Karnataka	178	476947
31	Lakshadweep (UT)	1	15
32	Puducherry (UT)	3	85
33	Tamilnadu	157	273857
	Sub-Total	**866**	**1946026**
	GRAND TOTAL	**6156**	**28680741**

Annexure-9

Estimates of Milk Production for 2006-07 to 2010-11

Sl.No	States/ UTs	Milk Production (Th Tonnes)				
		2006-07	2007-08	2008-09	2009-10	2010-11
1	Andhra Pradesh	7938	8925	9570	10429	11203
2	Bihar	5451	5783	5934	6124	6517
3	Chhattisgarh	849	866	908	956	1029
4	Goa	57	58.4	58.8	59.0	59.6
5	Gujarat	7533	7911	8386	8844	9321
6	Haryana	5366	5442	5745	6006	6267
7	Himachal Pradesh	933	1007	1026	971	1102
8	Jammu & Kashmir	1400	1519	1565	1592	1609
9	Jharkhand	1401	1442	1466	1463	1555
10	Karnataka	4124	4244	4538	4822	5114
11	Kerala	2119	2253	2441	2509	2645
12	Madhya Pradesh	6374	6572	6855	7167	7514
13	Maharashtra	6978	7210	7455	7679	8044
14	Orissa	1431	1625	1598	1651	1671
15	Punjab	9168	9282	9387	9389	9423
16	Rajasthan	10309	11377	11931	12330	13234
17	Tamil Nadu	6277	6540	6651	6787	6831
18	Uttar Pradesh	18094	18861	19537	20203	21031
19	Uttarakhand	1213	1221	1230	1377	1383
20	West Bengal	3983	4087	4176	4300	4471
21	Arunachal Pradesh	49	31.9	24.4	26.3	28.4
22	Assam	750	752	753	756	790
23	Manipur	77	78.2	78.5	77.6	78.0
24	Meghalaya	74	76.7	77.5	78.1	79.1
25	Mizoram	16	16.5	16.9	10.6	11.4
26	Nagaland	67	45.4	53.4	77.7	76.0
27	Sikkim #	49	41.9	42.0	44.0	43.2
28	Tripura	89	91	96	100	104
29	A&N Islands	23	24	26	24	25.4
30	Chandigarh	46	46.5	46.6	46.4	45.0
31	D.& N. Haveli #	5	9.9	10.3	10.4	10.6
32	Daman & Diu #	1	1.3	1.4	1.4	1.4
33	Delhi #	288	445	450	466	480
34	Lakshadweep	2	2.1	2.3	2.3	2.0
35	Puducherry	45	46.5	45.5	45.9	46.7
	Total	**102580**	**107934**	**112183**	**116425**	**121848**

Figures from 2007-08 onwards are estimated based on the number of animals in milk as per livestock census 2007 and the yield rate of concerned neighbouring State(for Sikkim yield rate of West Bengal, Dadar & Nagar Haveli and Daman & Diu yield rate of Gujarat and for Delhi yield rate of Hryana) has been used

Source : State/UT Animal Husbandry Departments

Annexure-10

Estimated Budgetary Requirement for Horticulture Sector for Twelfth Plan		
	Restructured Programmes	**Rs. crore**
1.	Area Expansion Programmes in Integrated Project Mode	18000
2.	PHM and Cold Storages	7255
3.	Infrastructure development for Input production	500
4.	Marketing infrastructure, HRD, Market information	2000
5.	Technology Transfer for Productivity and Quality Production in Project Mode for new and old orchards	12000
6.	Enhancing Export Competitiveness	500
7.	Area Expansion Scheme for small & Marginal Farmers and Kitchen Garden Scheme	2000
8.	Additional Provision for NE region, Hilly areas and scheduled Areas	3000
9.	Horticulture Data Base and Crop Estimation	250
10.	Human Resource Development	250
11.	Crop Insurance and Setting up Weather Stations	320
12.	Schemes of Coconut Development	1000
13.	Schemes Components of Bamboo Development	500
14.	Horticulture Promotion Services – NCCD	25
15.	Schemes of Commerce ministry	3000
	Total	50,600
Source: Report of the Working Group on Horticulture and Plantation Crops for the 12th Plan		

Annexure-10 continued

Estimated Budgetary Requirement for Agricultural Marketing for Twelfth Plan		
		Rs. Crore
1.	Development of Marketing Infrastructure, of which	**7703**
	Terminal Markets	2400
	Wholesale Markets	2500
	Up-gradation of Regulated Markets	1250
	Rural periodic markets	188
	Livestock markets	125
	Specific Commodity Markets	1000
	Grading standardization and certification	240
2.	Development of virtual markets (covering market information dissemination, development of spot exchangers, market research, consumer awareness, etc.)	925
3.	Warehousing and bulk handling, of which	**8675**
	Cold Chain development	3600
	Grameen Bhandaran Yojana	4200
	Silo storage	550
	Integrated Bulk Logistics	225
	Modernisation of existing warehouses	100
4.	Linking Farmers to Markets (development of value chain, support to farmer groups)	1295
5.	Training and Capacity Building	300
6.	Secondary agriculture (medicinal & aromatic plants, organic farming etc.)	1100
7	Trade facilitation	210
	Total	**20208**
Source: Working Group on Agricultural Marketing for the Twelfth Plan		

Estimated Budgetary Requirement for MoFPI for XIIth Plan		
Sl. No.		Rs. crore
1.	Infrastructure Development Scheme, of which	5225
	Mega Food Parks/ Mini Food Parks Scheme	3250
	Scheme for Integrated Cold Chain, Value Addn, etc.	1675
	Scheme for Modernization of Abbattoirs	300
2.	National Mission for Food Processing (covering schemes for technology upgradation/ modernization of food processing industries, modernization of abattoirs, meat shops, HRD, promotional activities, etc.)	6533
3.	Strengthening of Institutions including skill development	1653
4.	Food safety, R&D and promotional activities	791
5.	Innovation Fund Scheme/ Venture Capital Fund	690
6.	Commitments of Eleventh Plan	412
	Total	15304
Source: Working Group on Food Processing Industries for the Twelfth Plan		

Annexure-10 continued

Estimated Budgetary Requirement for Strengthening Supply Chain during the Twelfth Plan Period (2012-17)		
Sl. No.	**Programmes**	**Rs. crore**
1.	Marketing infrastructures excluding Cold Storages (includes Mega Perishable Commodity Complex, refrigerated containers including insulated pre-cooled vans, mobile pre-coolers, Mega Food Parks/ Mini Food Parks Scheme, modernization of Abattoirs, wholesale markets, terminal markets etc.)	10,000
2.	Creation of additional capacity for cold storages and modernization of existing capacities	5,000
3.	Creation of Godowns for Foodgrain storage@	1,000
4.	National Mission for Food Processing (covering schemes for technology upgradation/ modernization of food processing industries, modernization of abattoirs, meat shops, HRD, promotional activities, etc.)	5,000
5.	Strengthening of institutions including skill development	2,000
6.	Development of virtual markets (covering market information dissemination, development of spot exchangers, market research, consumer awareness, etc.)	700
7.	Food safety, R&D and promotional activities	800
8.	Others including Innovation/ Venture Capital Fund	500
	Total	**25,000**

@For foodgrain storage, the proposed expenditure of Rs.11,000 crore (approx.) over the next 10 years is of non-plan nature as it would be in form of lease rentals. This includes storage capacity of around 15 million tonnes under Private Entrepreneurs Guarantee Scheme, 2008 (costing Rs.9,000 crore) and additional 2 million tonnes in form of silos (costing around Rs.2,000 crore). Plan assistance is limited to the extent of meeting the requirements of North East region (about Rs.400 crore) and remaining Rs.600 crore may be for Village Grain Bank Scheme or for providing assistance to State Governments, etc.

Annexure-11

Cold Storage Gap Assessed by National Spot Exchange in 2010

State	Cold Storage Requirement in '000 MT	Present Capacity* in '000 MT	Gap in '000 MT
Andhra Pradesh	2,324	901	1,423
Assam	919	88	831
Bihar	4,241	1,147	3,094
Chhattisgarh	543	342	201
Gujarat	2,748	1,267	1,481
Haryana	804	393	411
Himachal Pradesh	487	20	467
Jammu & Kashmir	737	43	694
Jharkhand	796	170	626
Karnataka	2,404	407	1,997
Kerala	2,771	58	2,713
Maharashtra	6,273	547	5,726
Manipur	80	0	80
Meghalaya	239	3	236
Mizoram	74	0	74
Madhya Pradesh	1,213	808	405
Nagaland	70	6	64
Orissa	1,835	291	1,544
Punjab	1,318	1345	-27
Rajasthan	391	324	67
Tamil Nadu	7,906	239	7,667
Tripura	163	30	133
UP & Uttarakhand	12,228	10,187	2,041
West Bengal	10,566	5,682	4,884
Total	**61,130**	**24,298**	**36,832**

* Present capacity estimates as of 2009

Source: NSE&DMI (present capacity in Delhi – 126,158 MT, Goa-7,705 MT, A&N-210 MT, Puducherry – 85 MT)

Annexure-12

Safal National Exchange – Paper from JS(NHM) – I

An idea that could not take off !

1. In order to bring transparency in the existing fruit & vegetable market mechanism for the benefit of farmers and consumers, NDDB had conceptualized the idea of an electronic spot exchange, first of its kind, for trading fresh fruits & vegetables. At this exchange, both the buyers and sellers can participate in the on-line trading without being physically present and without the quantity / prices of transactions becoming known to others.

2. NDDB, enabled by an amendment to the Karnataka Agriculture Produce Marketing (Regulation) Act, 2000, had set up a National Integrated Produce Market (NIPM) known as "Safal Market" at Bangalore. Under the amendment, NDDB is empowered to set up the exchange.

3. NDDB, through its subsidiary Mother Dairy Fruit & Vegetables Ltd. (MDFVL) entered into a Joint Venture (JV) Agreement dated 14 June 2006 with a) Multi-Commodity Exchange of India Ltd. (MCX), that has experience in running electronic futures exchange for commodity trading, and b) Financial Technologies India Ltd. (FTIL) which is a technology company providing software solutions online trading exchanges.

4. In pursuance of the JV Agreement, Safal National Exchange (SNX) was set up as a Public Limited Company in 2006. The Authorised share capital of SNX is Rs. 30.00 crore.

5. The exchange offered transparency and better price discovery mechanisms. The viability of the exchange was dependent on the fee to be charged and the volume of trade carried out through the exchange by the members. About 200 plus producers and traders were empanelled as members of the Exchange, under different categories, for carrying out trading transactions.

6. The promoters contributed Rs. 24.00 crore and the operations of SNX started in December 2007.

7. When the trading commenced, it was noticed that the traders/ members were not actively participating in the trading and a large number of the members did not trade at all. As a result, SNX was not able to generate the targeted volume of business.

8. As against the estimated trading volume of 874858 MT for the year 2007-08 (2916 MT per day considering 300 working days), the actual quantity traded on the exchange was 27840 MT (278 MT per day considering 100 working days as trading started in December 2007). As against estimated volume of 1093573 MT for the year 2008-09 (3645 MT per day considering 300 working days), the actual trading volume for the year was 32294 MT (108 MT per day considering 300 working days). The reasons for the low volumes are as follows :

    i. Government of Karnataka did not enforce the closure of the traditional Mandi, which was an important premise for the viability of the SNX, and

    ii. Traders and intermediaries were reluctant to record their transactions as most of their trading was being done informally, or on account of advances given to the producers

9. As the members failed to transact sufficient volumes, the exchange suffered heavy losses. For the FY 2007-08, the exchange incurred a loss of Rs. 9.59 crore as it could generate income of only Rs. 3.04 crore due to poor volume of transactions by the members. During the following year (FY 2008-09), losses mounted to Rs. 14.55 crore.

10. The JV partners, who contributed Rs. 24.00 crore in the project, lost their entire investment as the losses accumulated to Rs. 24.14 crore as on 31 March 2009.

11. In view of the mounting losses, the JV partners concurred that the operations of the exchange has not proceeded as envisaged and SNX cannot sustain further losses. Therefore, a decision was taken to close the operations of the exchange w.e.f. 31 March 2009.

12. Further, in conformance to the provisions of the Karnataka APMC Act (as mentioned in para (ii) above, NIPM can be established and managed only by NDDB directly or through any organization set up by it or through any farmers associations. The said provision thus permitted only NDDB to set up an exchange by itself or along with farmers associations and the provisions do not seem to envisage any participation by private parties in the ownership/ management of such exchange. Therefore, if MCX/ FTIL wanted to continue the operations of SNX after NDDB (through its subsidiary MDFVL) draws out of the JV Agreement, they would need to set up a different exchange and obtain appropriate approvals under the APMC Act.

Fresh & Healthy Enterprises Ltd – Paper from JS(NHM) – II

The National Horticulture Mission is working closely with FHEL to create cold chain logistics and infrastructure, besides direct procurement from farmers. After its declaration as a National level Agency (which enables direct funding from NHM), FHEL has been mandated with establishment of two 2000 MT CA storage for apples in J&K and HP, besides carrying out a techno feasibility study for a pan Indian grid for onions, kinnows and oranges in the first phase. Similar studies for the major horticulture crops (banana, apple, mango, tomato, pineapple, ginger) are proposed so that a clear assessment of the interventions required (procurement centres, CA/MA storage, reefer vans, railway wagons and or special trains)

FRESH & HEALTHY ENTERPRISES LTD. (FHEL)

1.0 Background/Company profile

1.1 India is the second largest producer of fruit and vegetables in the world with production of over 240 million MT. At present the total value of produce is estimated to the tune of Rs. 2,80,000 Cr. It is also estimated that 30-40% of the fruit and vegetables production is lost due to poor post-harvest management and absence of associated logistics. Given the above situation there exists a tremendous business opportunity in this particular area.

1.2 Realizing the potential in this area Container Corporation of India (CONCOR), a PSU under Ministry of Railways, Govt. of India decided to set up its fully owned subsidiary called Fresh & Healthy Enterprises Ltd (FHEL) in February 2006. It has been setup to create world class cold chain infrastructure in the country and to provide complete cold chain logistic solution to the various stake holders in this area. FHEL intends to derive its strength from CONCOR its holding company that has a track record of excellence in the logistic services sector.

1.3 The Company set up a Controlled Atmosphere Store at Rai, Sonepat having storage capacity of 12,000 MT which started functioning in August, 2007.

1.4 The Company's main function at present is to procure Apples from Shimla & Kinnaur districts of Himachal Pradesh, transport those trucks to CA Store at Rai, Sonepat for sorting, grading, packing & storage. These sorted, graded & packed Apples are sold either through Marketing Associates in Delhi, Mumbai, Chennai Ahmedabad and other fruit markets throughout India or directly to Retail Chains like Bharti Wal-Mart, Big Bazaar, Aditya Birla retail, etc.

1.5 In its development over last 5 years, FHEL has established itself as a leading player in premium quality Apples.

2.0 Core Competence :

2.1 **Direct procurement of apples from farmers** : FHEL was among the first companies to procure apples directly from the farmers and has now refined the procurement system. This has eliminated middlemen in the chain.

2.2 **Transportation** : FHEL is able to organize transportation of produce from Orchard areas of Himachal Pradesh to the facility at Rai. The apples harvested in a day are transported to Rai. This is necessary to ensure long life of apples during storage.

2.3 **Controlled Atmosphere Storage Technology** : The company has state-of-the-art storage technology to ensure that the apples last upto 8 months in the storage.

2.4 **Pre-harvest care and post-harvest management** : The company has been regularly engaging experts to advise farmers about pre-harvest care and post-harvest management of the produce, to ensure improvement in quality of produce and productivity of orchards.

2.5 **Marketing and Distribution** : The company directly markets fruit to most of the retail chains. Further, the company also supplies fruit directly to markets outside Delhi. With the above marketing and distribution, the company is able to shorten the supply chain, making the fruit availability at lesser rates.

3.0 FHEL -- a game changer

Ever since FHEL entered the apple business, there have been many changes in the sector, even though the procurement of FHEL is much smaller as compared to the total production, which is over 2 million MT per annum. First, FHEL works in an open and transparent manner and therefore, when it procures apples, all the farmers in Himachal Pradesh know the rates offered by it. This acts as a benchmark and all the farmers are able to bargain well with the traders. Secondly, FHEL at its own cost arranges scientists' visits to the villages to interact with the farmers and solve their problems for improving quality and productivity. Thirdly, FHEL also arranges all inputs required by the farmers like nutrient packages, pesticides/ fungicides, packing materials, farm implements, etc.

FHEL has acted as a catalyst for growth in investment in the sector. FHEL was the first company to enter into CA storage of apples and within 4 years of its establishment, the country now has almost 50,000 MT of CA storage capacities for apples.

Due to the presence of FHEL in Himachal Pradesh, the farmers have benefitted immensely by way of increased realization of their produce.

4.0 FHEL – A National Level Agency under National Horticulture Mission

4.1 The organization strives to remain the leading player in the Apple business and has a well prepared strategy for achieving "Mission & Objectives" which are summarized in Annexure-A.

In August 2011, National Horticulture Mission, under Department of Agriculture & Cooperation (DAC) declared FHEL as a National Level Agency. The company submitted plans for expansion of activities and some of these have already been approved and the company is in the process of working on those plans and these are as follows:

4.2 Procurement Centre in Himachal Pradesh: The company has planned a procurement Centre with 2000 MT Controlled Atmosphere (CA) Store at a cost of approx. Rs. 20 Crores. The land for the project has already been identified and the funds are earmarked and waiting for the State Govt. to allot the land.

4.3 CA Store of 2000 MT capacity in J&K: The project has already been approved by Department of Agriculture & Cooperation and subsequently by FHEL & CONCOR Board of Directors. Waiting for approval from Govt. of J&K.

4.4 Techno-feasibility Study on storage of onions, kinnows and oranges : The study has been fully funded by DAC. The objective is to study the best practices in the world for storage and distribution of these fruits and vegetables. Once the study establishes need of creation of infrastructure, the company will work on these projects. The tender for the study has already been opened and it is proposed to award the contract for appointment of consultants in the next 3 weeks.

Annexure - A

1. MISSION AND OBJECTIVES OF FHEL

- To develop into a world class organisation using state-of-the-art technologies for procurement, transportation, storage and distribution of fruits and vegetables in the country.
- This is to be achieved by setting up modern controlled atmosphere storage facilities and by developing strong long term linkages with farmers, agricultural institutes logistics operators and governmental agencies with emphasis on information technology solutions for all activities.
- The company will strive to provide value for money to its customers and fulfill aspiration of its stakeholders by providing qualitative and efficient services.

2. FHEL- CORPORATE OBJECTIVES

- To set up an integrated cold supply chain in India for fruits & vegetables using state-of-the-art technology.
- To establish standards of quality for fruits and vegetables procured and marketed by the company.
- To strive for providing value for money to farmers & customers.
- To follow highest standards of business ethics and be responsible to its social obligations.
- To maintain absolute integrity, honesty, transparency and fairplay in all its public dealings.

Supply Chain Inefficiencies in Agriculture Produce – Paper from JS(NHM) – III

S. No.	Area	Present Practice	Need for a Shift
1	**Production**	• **Low Productivity on account of** - • Lack of quality inputs such as planting materials • Higher Input costs including cost of credit • Farmers not able to utilize the subsidies in an efficient manner due to implementation issues such as L1 process. In many cases, farmers are reluctant to buy seeds, etc from L1 supplier as they are not confident of quality • Reduction in vegetable growing areas in Peri-urban locations • Post harvest losses due to lack of proper extension services	• Improving productivity in a project mode • Innovative approaches for making available quality inputs such as planting materials • Support extension services • Subsidy disbursal: Give options to farmers to buy from a range of companies rather than forcing them to buy from L1 • Consolidate vegetable production in per-urban areas through green houses/poly houses
2	**Primary Processing and Aggregation**	• No grading and sorting • No pre-cooling • No aggregation	• Encourage mobile grading and sorting equipment • Incentivise grading and sorting • Robust organizations which can organize the aggregation of produce • Viability gap funding for organizations involved in developing producer groups
3	**Storage and Transportation**	• Lack of cold storages and storage facilities • Poor packaging materials such as gunny bags • Poor transportation • Lack of reefer transportation	• Low cost storage structures such as bamboo based structures for onions and Pusa low cost energy structures • CA/MA storage facilities close to production areas • Subsidize crates used for shipping produce • Customised solutions for pre-cooling and transportation • Bulk transportation of high volume vegetables through dedicated perishable cargo trains • Promote irradiation which increases shelf life
3	**Infrastructure**	• High cost • Power availability • Seasonal Utilization • Absence of complete chain	• Long term financing models • Low rate of interest loans • Incentivize the use of solar energy in cold storages • Viability gap funding for investments made in cold chain and reefer transport • Building cold storages as per the latest norms prescribed by the International Institute of Refrigeration

4	**Markets**	• Restrictions on the number of market players by way of mandi licenses • Non-uniform reforms i.e. reforms in production zones and no reforms in consumption zones • Sale through commission agents results in no value addition and price escalation	• Encourage electronic auctions in all markets. This will increase competition and bring about transparency • De-list fruits and vegetables from schedule-1 of APMC Act • Build new wholesale markets in metros and urban clusters
5	**Retail**	• High wastages due to multiple handling and intermediaries • Ineffective utilization due to lack of cold chain facilities at retail end	• Incentivize modern push carts • FDI in Retail
6	**Stock Limits**	• Stock limits imposed both in consumption and production centers • While large players exit from the market, small traders hoard produce by storing it on behalf of farmers	• Remove stock limits but improve monitoring of stocks held by various players • Use of information Technology in monitoring of stocks rather than imposing stock limits
7	**Market Intelligence**	• Ineffective market intelligence and forecasting systems about demand and supply of commodities	• Robust IT based market intelligence system that forecasts demand and supply of F&V requirements of a city • Provide early warning to policy makers/ market players about shortages and price spikes
8	**Incentives**	• Investment linked tax benefits	• 100 per cent subsidy for infrastructure developed by producer organizations and companies and/or aggregators which have a long term buy back arrangements with FPOs/FIGs

DAC initiatives for Improving Post Harvest Management of Perishables – Paper from JS(NHM) – IV

1. **FINANCIAL ASSISTANCE:**

1.1 Ministry of Agriculture is providing assistance under various schemes for setting up Post Harvest infrastructure, processing and cold storage units for storage of perishable horticultural crops including potato through its schemes like National Horticulture Mission (NHM), HMNEH and National Horticulture Board (NHB). In addition to Ministry of Agriculture, APEDA and Ministry of Food Processing Industries are also providing assistance for the establishment of Cold Storages.

Details of Cold Storage developed/sanctioned through NHB (during 1999 -2000 to 2011 – 2012), NHM (during 2005-06 to 2011 -12 up to 20.03.2012), is as under:

S. No.	Scheme	No. of Cold Storage	Financial Assistance (in Crore)	Capacity (in Million MT)
1	NHB	2775	767.89	11.76
2	NHM	569	371.22	3.65

1.2 Post harvest infrastructure includes setting up of pack house, precooling unit, cold storage, CA/MA storage, refer transport, ripening chambers etc. Credit linked back ended enhanced subsidy @ 40% of the project cost in general areas and 55% in case of hilly and schedule areas for individual entrepreneurs is available since 1.4.2010with an upper limit of 5000 MT capacity. Before April, 2010 it was 25% and 33% respectively.

2. **NOTIFICATION OF TECHNICAL STANDARDS**:

Based on the report of the Task Force on Development of Cold Chain in India (2007-08) Department of Agriculture & Cooperation (DAC) Govt. of India set up a Technical Standards Committee (TSC) headed by Managing Director, NHB. TSC had accordingly, submitted Technical Standards for storing fresh fruits & vegetables which had been notified for implementation w.e.f. 1.4.2010. These are

a. Fresh Horticulture produce Not requiring pre-cooling before storage
(Technical standards number NHB-CS-Type 01-2010)

b. Fresh Horticulture produce requiring pre-cooling before storage
(Technical standards number NHB-CS-Type 02-2010)

c. Control Atmosphere (CA) Cold Storage
(Technical Standards Number NHB-CS-Type 03-2010)

d. Fruit Ripening Units
(Technical standards number NHB-CS-Type 04-2010)

3. **ESTABLISHMENT OF NCCD:**

The gap in the Cold Chain infrastructure necessitates focused interventions of its establishment at par with global standards and protocols so that F&V produce has a longer shelf life, benefitting not only producers (farmers, processors), consumers and exporters but also enabling a specialized industry to come up with a host of allied and ancillary activities and service providers. With this perspective, during 11th Plan Period, National Centre for Cold Chain Development (NCCD) has been promoted jointly with stake-holders for promotion of quality regime in cold chain infrastructure development and management. NCCD has been mandated to:

(a) Provide an enabling environment for the cold chain sector to gain prominence and invite the much needed private sector involvement.
(b) To establish standards and protocols related to cold chain testing, verification, certification and accreditation as per international standards.
(c) To provide technical assistance to financial institution, government departments/agencies, and industry for selection of cold chain component such as refrigeration units, refrigerated transport equipment, display cabinets, milk tanker etc.
(d) To offer HRD and technical advisory services to personnel engaged in this sector.

4. **WAREHOUSE RECEIPTS:**

Final report on "Cold Storage Warehouse Manual for Cold Storages Warehouses for Horticulture produce and processed Food items" under WDRA has been sent to Department of Food & Public Distribution for its notifications The report contains (a) Application Form for Warehouse Accreditation (b) Description of Cold Storage Warehouse (c) Identity of Warehouseman and Capacity to Discharge Liability (d) Goods to be Stored, Storage Conditions and Insurance Cover (e) Managerial Competence (f) Storage Worthiness of Warehouse (g) Check List for Accreditation Agency (h) List of Commodities* for Issuance of NWRs and (i) General Guidelines for Grading, Sampling, Packaging etc.

* List of commodities for issuance of NWRs by the warehouses (cold storages)

1. Table Potatoes (with or without CIPC application)
2. Seed Potatoes
3. Processing (Potatoes with CIPC application)
4. Apples in CA storage
5. Carrots
6. Nagpur Mandarin
7. Khasi/Darjeeling/NE Oranges
8. Kinnow
9. Sweet Lime
10. Lemon
11. Pomegranate
12. Grapes
13. Almond
14. Raisins
15. Onion (Fresh or dehydrated)
16. Garlic (Fresh or dehydrated)
17. Ginger (Fresh or dehydrated)
18. Dried edible mushrooms
19. Red Chillies
20. Coriander (Dry)
21. Cinnamon
22. Turmeric
23. Tamarind
24. Date Palm
25. Frozen Processed Food Item of horticulture Origin including those frozen in IQF or Blast Freezing.
26. Seeds & bulbs

Ensuring Competition and Price Discovery for Perishables– Paper from JS(NHM) – V

1. Unlike cereals, pulses and oilseeds for which the Union Government announces a MSP, and are also amenable to grading, most perishables are completely dependent for price discovery and on intermediaries who have a stronghold on Agricultural Produce Market Committee (APMC) market where perishable produce is mandated to be sold.

2. APMC markets were established in 1950's primarily for cereal crops and to ensure that intermediaries (who were also money lenders) do not compel farmers to sell their produce at the farm gate. The idea was that all produce should first be brought to the market yard where farmers could get a competitive price, and assured payment for their produce. The Act was made at a time when information about prices and bargaining capacity of farmers was rather Weak.

3. The definition of agriculture used in APMC Act was very wide. Even though the main focus was on cereals, pulses and oil-seeds, horticulture produce also came within the broad definition of agriculture.

4. Over the last five decades, the share of perishable produce in the APMC market is increasing, and in APMCs which serves Metros and urban clusters, perishables account for a substantial portion of the produce. The Azadpur Mandi in NCT of Delhi principally caters to perishable crops.

5. It may also be noted that during these decades, the number of producers and consumers has grown manifold, as also the volume of production. However, the number of intermediaries has remained constant.

6. Even though the margin of intermediation should have come down on account of growing volumes and value, the commission has actually gone up, and ranges from 6 to 11%. It may also be mentioned that in the case of non-perishables the commission ranges from 1.5 to 3%.

7. Intermediaries are rent seekers and resist all attempts to introduce technology for reduction in transaction cost and time. Even when electronic auction centres were established like the Safal National Exchange in Bangalore, the existing markets did not allow the transition to a transparent system.

8. Even as production and productivity of perishables grows, prices are determined by intermediaries because of their stranglehold on the markets. Thus prices of growers are depressed when production is high, but the benefits are not passed on the consumers. Likewise, when consumers prices are high, the farmers do not get higher returns on their produce.

9. Intermediaries do not have an incentive to offer premium on quality produce as there is no system of segregating better quality produce in the extant vegetable supply chain.

What can be done:

1. All APMCs should introduce electronic auction platform for transparent price discovery.

2. Open membership of APMC's by encouraging wholesalers and retailers to enter into transactions with the growers. The Market Committee should only fix the transaction fee and keep a Bank Guarantee equivalent to two training cycles to ensure that the producers payment is not affected.

3. Allow producer organizations and cooperatives, as well as organized retail to open new markets for perishables. Agricultural Produce Market Committee Act must allow the establishment of such markets.

4. Encourage contract farming, and consolidation centers near production areas.

5. Support FPO's and FIG's to establish direct link with market aggregators.

6. Promotion of Cold Chain Infrastructure and encouraging cold storage to register themselves with Warehousing Development and Regulatory Authority (WDRA) to facilitate issue of negotiable receipts/instruments.

Role of CCI:

1. Direct APMC's to open membership of markets to prevent monopolistic trade practices.

2. Encourage Spot and Forward Markets in perishables, and have regular interaction with Farmers organizations/ Small Farmers Agri-Business Consortium (SFAC) and Forward Markets Commission(FMC) and Warehousing Development and Regulatory Authority (WDRA).

3. Advise State Government to amend APMC Act to bring in them in line with the model APMC Act.

4. Support the creation of a Pan-Indian Market for perishables, by increasing the temporal and spatial domain by creation of Cold Chain Infrastructure, Warehouses Receipts (WR's) and dedicated rail corridor for transport of perishables.

Dedicated Horticulture Train – Paper from JS(NHM) – VI

NHB and Concor have poioneerd the linking of production clusters with major consumption areas by a multi-modal transport system. Accordingly, the horticulture train was introduced by CONCOR initially for Bhusawal – New Azadpur – Turbhe – Bhuwasal route targeting banana and potato as core cargo. It comprises of 20 hi-cube ISO freight containers whose load factor depends on type of produce; type of packing etc.

The pilot project faced a number of operating issues which are being resolved by CONCOR under technical advice from NHB. Even stake-holders have different expectations which can be fulfilled in due course.

The said container was put on field trial during July-August, 2011, and again in March 2012 by stuffing the container with various horticulture produce (table-potato from Kharagpur – Coimbatore; Banana from Solapur and Jalgaon to New Delhi and Apples from New Delhi to Kolkatta) and exposing it to different Agro-Climatic zones.

Purchase of 50'x40' refrigerated containers and 90 wagons to be used in dedicated closed circuit movement between:

i) Bhusawal and New Azadpur with Banana in North direction and Potato southwards.

ii) Bhusawal and Singur/Howrah.

- **Cost:**

  Cost of one container is Rs. 28 Lakhs

  Cost of 90 container is Rs. 25.20 crore

  NHB share is Rs. 12.60 crore.

- Capacity 10-12 Tonnes per container depending upon the nature of produce.

10-12 Tonnes for one container and 90 container Rs. 16 crore - total cost

Efforts are being made to introduce it as a regular service. Matter has been taken up with Concor and railway Ministry.

Annexure-13

F.No.20 (2)/2011-DP
Planning Commission
(Development Policy Division)

Yojana Bhavan,
Sansad Marg, New Delhi-110001,
Dated: the 7th March 2011

ORDER

Setting up of a Committee for Encouraging Investments in Supply Chains Including Provision for Cold Storages for More Efficient Distribution of Farm Products

The extracts of Cabinet Secretary's D.O. No. 102/2/1/2011-CA.IV dated 3rd February, 2011 are reproduced below:

"The Prime Minister has approved that investment will be encouraged in supply chains, including provisions for cold storages, which will be dovetailed with organized retail chains for quicker and more efficient distribution of farm products and minimizing wastage. In this context, a Committee may be set up in the Planning Commission, *inter alia*, comprising D/o Industrial Policy & Promotion, D/o Food & Public Distribution, C/o Agriculture & Cooperation, D/o Animal Husbandry, Dairying & Fisheries and M/o Food Processing Industries, for formulating suitable schemes and policy initiatives."

2. Accordingly, a Committee is constituted under the Chairmanship of Dr. Saumitra Chaudhuri, Member, Planning Commission with the following members:-
   (i) Secretary, Department of Industrial Policy & Promotion
   (ii) Secretary, Department of Food & Public Distribution
   (iii) Secretary, Department of Agriculture & Cooperation
   (iv) Secretary, Department of Animal Husbandry, Dairying & Fisheries
   (v) Secretary, Ministry of Food Processing Industries
   (vi) Shri T Nanda Kumar, Member, National Disaster Management Authority
   (vii) Shri Rakesh Bharti Mittal, Chairman, CII National Council on Agriculture
   (viii) Shri B Thiagarajan, Chairman, CII Task Force on Cold Chain Development
   (ix) Shri S Sivakumar, Chief Executive, Agri Business Division, ITC Ltd.

   Dr. Ashok Sahu, Principal Adviser (Development Policy and Perspective Planning), Planning Commission will be the Secretary of the Committee.

3. The Chairman can co-opt any other Member (s) as considered necessary.

4. The Terms of Reference (ToR) of the committees will be as follows:

   (i) To assess the existing framework of supply chains, including cold storages, in respect of farm products;
   (ii) To make an assessment of the future requirements over the next 6 years i.e. up to the end of the Twelfth Five Year Plan;
   (iii) To lay down a policy framework by which the supply chains can be dovetailed with the organized retail chains to achieve quicker and more efficient distribution of farm products and minimize wastage;
   (iv) To recommend on policy initiatives, suitable schemes and investments required for this purpose.

5 Senior Consultant (Agriculture) and Adviser (Industry), as concerned Divisional Heads in the Planning Commission will provide inputs and attend the meetings of the Committee.

6. The expenditure on TA/ DA for the Members in connection with the meetings of the Committee shall be borne by the parent Department/ Ministry/ Organisation. The expenditure, if any, in respect of non-official Members will be borne by the Planning Commission as per rules & regulations of TA/ DA applicable to Grade-I officers of the Government of India.

7. The Committee will submit its Report to the Cabinet Secretary within a period of 3 months.

8. This issues with the approval of the Deputy Chairman, Planning Commission.

-sd-
(Dr. Yogesh Suri)
Adviser (DP)

Copy forwarded for information and necessary action to:-

1) Dr. Saumitra Chaudhuri (Chairman of the Committee), Member, Planning Commission.
2) Shri R P Singh, Secretary, Department of Industrial Policy & Promotion, Udyog Bhavan, New Delhi
3) Dr. Bhushan Chander Gupta, Secretary, Department of Food & Public Distribution, Krishi Bhavan, New Delhi
4) Shri Prabeer Kumar Basu, Secretary, Dept. of Agriculture & Cooperation, Krishi Bhavan, New Delhi
5) Shri Rudhra Gangadharan, Secretary, Dept. of Animal Husbandry, Dairying & Fisheries, Krishi Bhavan, New Delhi
6) Shri Ashok Sinha, Secretary, Ministry of Food Processing Industries, Panchsheel Bhawan, August Kranti Marg, Khelgoan, New Delhi
7) Shri T Nanda Kumar, Member, National Disaster Management Authority, NDMA Bhawan, A-1, Safdarjung Enclave, New Delhi
8) Shri Rakesh Bharti Mittal, Chairman, CII National Council on Agriculture, Confederation of Indian Industry, CII Headquarters, New Delhi
9) Shri B Thiagarajan, Chairman, CII Task Force on Cold Chain Development, CII Headquarters, New Delhi
10) Shri S Sivakumar, Chief Executive, Agriculture Business Division, ITC Ltd., 31, Sarojini Devi Road, Secunderabad
11) Dr. Ashok Sahu, Principal Adviser (DPPP), Planning Commission, Yojana Bhawan, New Delhi
12) Shri Lambor Rynjah, Sr. Consultant (Agriculture), Planning Commission,Yojana Bhawan, New Delhi
13) Smt Renu S Parmar, Adviser (Industry)**,** Planning Commission, Yojana Bhawan, New Delhi

Copy for information to:

1. The Cabinet Secretary, Rashtrapati Bhawan, New Delhi
2. P.S. to Deputy Chairman / Member Secretary/ Pr. Adv(DPPP)/ JS (Admn)/ Dir (FR) Planning Commission

-sd-
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