CHAPTER

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AGRICULTURE AND FOOD MANAGEMENT

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*Between 2000 and 2010, the contribution of cereals and pulses in the overall per capita food expenditure reduced from 40 per cent to 28 per cent, while that of animal-based products and fruits and vegetables rose from 36 per cent to 42 per cent–this change in consumption pattern has improved productivity of Indian farmers as well and studies show agricultural output per worker increased two times between 2000 and 2010. Barring this small tract, however, India's agriculture presents a dismal scenario with stagnating yield and low farmers income.**

* See ***Third Food and Agriculture Integrated Development Action Report*** titled *'India as an Agriculture and High-value Food Powerhouse: A New Vision for 2030'*, prepared jointly by *CII* and *McKinsey & Company*, N. Delhi, Released on 12th April 2013.

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INTRODUCTION

Agriculture remains the most important sector of the Indian economy, whether it be the pre-independence or the post-independence periods. This fact is emphatically proved by the large number of people who depend on it for their livelihood. Before starting any discussion on Indian agriculture, we must look into its ***special features***:

(i) From the monetary point of view the share of the agriculture sector in the economy remains at ***14.1 per cent of the GDP***.[1] In the fiscal 1950–51 agriculture accounted for 55.4 per cent in the GDP.

(ii) The share of agriculture has been falling in the country's gross income, while industrial and services sectors' shares have been on a rise constantly. But from the livelihood point of view still ***55 per cent*** people of India depend on the agriculture[2] sector. This makes it a more important sector than the industry and the services (for Nepal and Tanzania the dependency for livelihood on agriculture is still higher at 93 per cent and 81 per cent, respectively). It means that 55 per cent of the population lives with only 18 per cent of the total income of the Indian economy—this fact clearly substantiates the reason why the people who depend on agriculture are poor. In the developed economies such as the USA, France, Norway, the UK and Japan, agriculture contributes only 2 per cent of their GDP with only 2 per cent people dependent on this sector for their livelihood.

(iii) Agriculture is not only the biggest sector of the economy, but also the biggest private sector too. It is the only profession which still carries no burden of individual income tax.

(iv) This is the biggest ***unorganised sector*** of the economy accounting for more than 90 per cent share in the total unorganised labour-force (93 per cent of the total labour force of the economy, i.e., 39.7 crores is employed in the unorganised sector)[3].

(v) India has emerged as a significant agri exporter in a few crops, viz., cotton, rice, meat, oil meals, pepper and sugar. As per the *World Trade Organization's Trade Statistics*, the shares of India's agricultural exports and imports in world trade in 2013–14 were 2.69 and 1.31 per cent respectively.[4] Agricultural exports as a percentage of agricultural GDP have increased from 9.10 per cent in 2008–09 to 14.05 per cent in 2013–14. During the same period, agricultural imports as a percentage of agricultural GDP also increased from 3.94 per cent to 5.50 per cent.

(vi) According to the export figures, agriculture is deeply related to industrial growth and the national income in India—1 per cent increase in the agricultural growth leads to 0.5 per cent increase in industrial output (growth) and 0.7 per cent increase in the national income of India.[5]

1. ***Economic Survey 2014–15,*** MoF, GoI, N. Delhi, pp. 76-77.
2. **India 2015,** Pub. Div., N. Delhi, p. 86
3. ***Labour Bureau,*** GoI, N. Delhi, March 2012.
4. ***Economic Survey 2014–15***, MoF, GoI, N. Delhi, Vol. 2, p. 89.
5. This corelation has been pointed out by many great economists in India since 1960s, for example, by ***Prof. Raj Krishna (1976), S. Chakravarty (1974–79)*** and ***C. Rangarajan, 1982*** to quote some of the most important names.

(vii) The industrial sector was selected as the ***'prime moving force'*** of the economy in the late 1940s. But due to market failure the sector failed to lead the economy. Without increasing the income of the people who depend on agriculture for their livelihood, the market was not going to support the industries. As a result, the Government of India announced agriculture as the prime moving force of the economy in 2002.[6]

(viii) With 1 per cent increase in the share of agriculture in India's total exports, the money which flows puto agriculture is calculated to be Rs. 8,500 crores.[7]

(ix) In **2014–15**, total foodgrains production in the country is estimated at 257.07 million tonnes (AE).[8] As compared to last year's production of 265.57 million tonnes, current year's production of foodgrains is lower by 8.5 million tonnes. This decline has occurred on account of lower production of rice, coarse, cereals and pulses due to erratic rainfall conditions during the monsoon season-2014.

(x) ***Productivity Gap*** *between on-the-field and ideal farm practices decreasing.* As per the recent release of the GoI, the average productivity of rice, wheat and pulses which was 2,202 kg, 2,802 kg and 625 kg per hectare in 2007–08 increased to 2,346 kg, 3,026 kg and 649 kg per hectare during 2011–13.[9]

(xi) Nearly 66 per cent of the cropped area in the economy still depends on the uncertainties of ***monsoon*** for their irrigational requirements.[10]

KHARIF & RABI

There are certain special terms used to understand the cropping seasons of India. The agricultural crop year in India is from *July to June.* The Indian cropping season is classified into two main seasons- (i) kharif and (ii) rabi based on the monsoon. The kharif cropping season is from *July to October* during the South-West/Summer Monsoon and the rabi cropping season is from *October to March* (North-East/Returning/Winter Monsoon). The crops grown between March and June are summer crops, known as of *jayads.*

Pakistan and Bangladesh are two other countries that are using the term 'kharif' and 'rabi' to describe about their cropping patterns. The terms 'kharif' and 'rabi' originate from Arabic language where kharif means *autumn* and rabi means *spring.*

The kharif crops include rice, maize, sorghum, pearl millet/bajra, finger millet/ragi (cereals), arhar (pulses), soyabean, groundnut (oilseeds), cotton, etc. The rabi crops include wheat, barley, oats (cereals), chickpea/gram (pulses), linseed, mustard (oilseeds) etc.

FOOD PHILOSOPHY OF INDIA

Indian food philosophy[11] is generally seen divided into three phases with their own objectives and challenges:

6. ***Approach Paper to the Tenth Five Year Plan,*** Planning Commission, GoI, N. Delhi, 2002.
7. This was the general opinion of the experts throughout 1990s but the official document which accepted this contention was the ***Foreign Trade Policy 2002-07,*** Ministry of Commerce, GoI, N. Delhi. The view has been continued with by the GoI in all of its forthcoming trade policies.
8. **Economic Survey 2014-15**, MoF, GoI, N. Delhi, Vol. 2, p. 77.
9. ***Press Release,*** Ministry of Agriculture, GoI, N. Delhi, May 22, 2013.
10. ***Economic Survey 2011-12,*** op. cit., p. 191.
11. ***Indian Council of Agricultural Research (ICAR),*** N. Delhi, 1998.

THE FIRST PHASE

This phase continued for the first three decades after Independence. The main aim and the struggle of this phase was producing as much foodgrains as required by the Indian population, i.e., achieving ***physical access*** to food.

The idea of the Green Revolution at the end of this phase at least gave India the confidence of realising the objective. At the end of the 1980s, India was a self-sufficient country regarding food.

THE SECOND PHASE

Meanwhile India was celebrating its success of the first phase, a new challenge confronted India—achieving ***economic access*** to food. The situation went on worsening and by early 2000 there was a paradoxical situation in the country when it was having more than three times buffer stocks of foodgrains in the central pool, but in several states people were dying due to lack of food—a complete mockery of the logic behind maintaining buffer stock, success of green revolution and the concept of India being a welfare state.[12] The Supreme Court intervened after a PIL was filed by the People's Union for Civil Liberties (PUCL) and a national level Food for Work Programme came up (to be merged with the National Rural Employment Guarantee Scheme). The courts took the governments on task if foodgrains rot either in godowns or destroyed in oceans to manage market price for the foodgrains, or if the Centre had to go for exporting wheat at very low price. In this process India emerged as the ***seventh largest*** exporter of wheat (2002). Basically, we were exporting the share of wheat which was not consumed by many Indians due to lack of economic reach to food.

As the inputs of the Green Revolution were costlier, its output naturally were to be costlier. To fight the situation there should have been a time-bound and target-oriented macro-economic policy support, which could deliver comparative increase in the purchasing capacity of the masses to make food affordable for them. India badly failed in it. The crisis was managed by throwing higher and higher subsidies ultimately affecting government expenditure on the infrastructural shortcomings in the agriculture sector. Even after providing higher food subsidies, some people failed to purchase food and they were left with no option but to die of hunger.

India is still in this phase and trying to solve the crisis through twin approach firstly, by creating maximum number of gainful employment and secondly by cutting cost of foodgrains (via the second green revolution based on biotechnology).

It must be kept in mind that the food self-sufficiency happiness was a temporary thing for India. By the mid 1990s, India realised that its foodgrain production was lagging behind its population increase. It means India is still fighting to achieve physical reach to the required level of food.

THE THIRD PHASE

By the end of the 1980s, world experts started questioning the very way world was carrying on with different modes of production. Agricultural activitiy was one among them which had become hugely based on industries (chemical fertilizers, pesticides, tractors, etc.). All developed economies had declared their agriculture to be an industry.[13]

It was time to look back and introspect. By the early 1990s, several countries started going for ecologically friendly methods and techniques of industrial, agricultural and services sectors development. The much-hyped Green Revolution was declared ecologically untenable and the world headed for organic farming, green farming, etc.

12. ***India 2000*** and ***Economic Survey 2000–01,*** GoI, N. Delhi.
13. ***Brundtland Report*** on Sustainable Development after the deliberations at the summit ***"Our Common future",*** 1987.

It meant that achieving physical and economic reach to food was not the only challenge India was facing, but such aims should not be realised at the cost of the precious ecology and biodiversity—a new challenge! India needed a new kind of green revolution which could deliver it the physical, economic as well as *ecological access* to food—the Second Green Revolution—an all-in-one approach towards the agriculture sector.

LAND REFORMS

The official stance and emphasis on land reforms in India have been changing over the time in wake of the emerging issues, which may be seen in two phases:

PHASE-I

This phase commences just after Independence.

All economies were agrarian before they were industrialised, only their periods vary. Once democratic systems developed, the first thing the developed countries of today did was to complete the agrarian reforms in a time-bound way. As land remains the means of livelihood for the larger section of society in an agrarian economy, the successful completion of agrarian reforms benefitted the maximum number of people thereby improving their economic conditions. At the time of Independence, India was a typical agrarian economy and had inherited a very inequitable agrarian system. Land reforms will be a major plank of independent India and as part of the agrarian reforms it was made clear by the pledge of the Indian National Congress in 1935 itself. Land reforms in India had three objectives similar to the other economies which opted for it in the past:

(i) Removing ***institutional discrepancies*** of the agrarian structure inherited from the past which obstructed increasing agricultural production, such as—the size of agricultural holding, land ownership, land inheritance, tenancy reforms, abolition of intermediaries, introduction of modern institutional factors to agriculture, etc.

(ii) The other objective of the land reforms in India was related to the issue of ***socio-economic inequality*** in the country. The high inequality in land ownership not only had a its negative economic impact on the economy; but it was badly intertwined with the caste system in India and the allocation of social prestige and status by the society at large.[14] More than 80 per cent of the population from its livelihood inherited the agrarian system which had inequitable ownership of the asset, i.e., land to earn income. The government wanted to go for a restructuring of the land ownership in the economy on logical grounds and with public welfare approach. This objective of the land reforms got enough socio-political attention as it tried to dismantle the age-old agrarian structure in the country. It became such a hot issue that land reforms in India got a 'bad-name', synonymous to land-grabbing by the government and allotting them to the landless masses.

(iii) The third objective of the land reforms in India was highly contemporary in nature, which did not get enough socio-political attention—it was the objective of ***increasing agricultural production*** for solving the inter-related problems of poverty, malnutrition and food insecurity.

14. Rudolph, L.I and S.H. Rudolph, ***In Pursuit of Lakshmi: The Political Economy of the Indian State,*** Orient Longman, Bombay, 1987, pp. 45–50.

To realise the objectives of the land reforms, the government took three main steps which had many internal sub-steps:

1. Abolition of Intermediaries

Under this step, the age-old exploitative land tenure systems of the Zamindari, Mahalwari and Ryotwari were fully abolished.

2. Tenancy Reforms

Under this broader step, three inter-related reforms protecting the land–tenants were effected:

(i) *Regulation of rent* so that a fixed and rational rate of rent could be paid by the share-croppers to the land owners;

(ii) *Security of tenure* so that a share-cropper could be feel secure about his future income and his economic security; and

(iii) *Ownership rights to tenants* so that the landless masses (i.e., the tenants, the share-croppers) could get the final rights for the land they plough—*"land to the tillers"*.

3. Reorganisation of Agriculture

This step again has many inter-related and highly logical provisions in the direction of rational agrarian reforms:

(i) *Redistribution of land* among the landless poor masses after promulgating timely ***ceiling laws***—the move failed badly with few exceptions, such as West Bengal, Kerala and partially in Andhra Pradesh.

(ii) *Consolidation of land* could only succeed in the regions of the Green Revolution (i.e., Haryana, Punjab and western Uttar Pradesh) and remained marred with many loopholes and corruption.

(iii) *Cooperative farming,* which has a high socio-economic moral base, was only used by the big farmers to save their lands from the draconian ceiling laws.

The whole attempt of land reforms in India is considered a big failure by the majority of experts. Many consider the issue of land reforms in India as the most complex socio-economic problem of human history.[15] Data regarding the numerical achievements of land reforms have been highly discouraging.[16]

(i) Tenancy reforms made tenants have their rights but only on 4 per cent of the total operated areas of India (14.4 million hectares of operated area by 11 million tenants by 1992).

(ii) Redistribution of ownership rights of land took place but on only 2 per cent of the total operated area of the country (less than 2 million hectares among the 4.76 million people by 1992).

(iii) Taken together, the whole process of land reforms could benefit only 6 per cent of the operated area of the country with a negligible socio-economic positive impact.

It was the failure of land reforms which made the government easily attracted towards the new policy of the Green Revolution in the coming times—land reforms had failed to increase agricultural production thus the government opted the route of increasing the productivity to reach the same goal, i.e., the initiation of the new techiques of agriculture.

REASONS FOR FAILURE OF LAND REFORMS

Out of many reasons forwarded by the experts responsible for the failure of the land reforms in

15. This was the view of the majority of the experts around the world by the late 1960s.

16. P.S. Appu, ***Land Reforms in India: A Survey of Policy, Legislation and Implementation,*** Land Reforms Unit, Lal Bahadur Shastri National Academy of Administration, Mussouri, 1995, pp. 232–33.

India, the following three could be considered the most important ones:

(i) Land in India is considered a symbol of social prestige, status and identity unlike the other economies which succeeded in their land reform programmes where it is seen as just an economic asset for income-earning.

(ii) Lack of political will which was required to affect land reforms and make it a successful programme.

(iii) Rampant corruption in public life, political hypocricy and leadership failure in the Indian democratic system.

LAND REFORMS & GREEN REVOLUTION

Once the government launched the Green Revolution, the issue of land reforms almost got marginalised due to the following reasons:

(i) There is an inherent diabolic relationship between the Green Revolution and the land reforms as the former suits bigger and economic land holdings, while the latter intended to fragment the land among a large number of the masses.

(ii) The land reforms were socially opposed by the land-owning caste lobbies, while there was no such opposition to the Green Revolution.

(iii) The level of legislative attempts taken by the governments regarding the land reforms till date had almost no positive socio-economic impact on the country, while the GR was having all potential of proving higher yields of foodgrains.

(iv) The subsidised supplies of foodgrains under PL480 were hampering India from carving out its independent diplomacy, as well as there has always remained a doubt about the regular supplies of wheat.

(v) International pressure as well as the suggestions from the world Bank besides the success stories of the Green Revolution from the countries where it had increased the yield of wheat.

PHASE-II

The second phase of land reforms can be traced in the process of economic reforms. Economic reforms exposed the economy to the new and emerging realities, such as, land acquisition and leasing, food-related issues and the agricultural provisions of the World Trade Organization (WTO). We see a shift *(Economic Survey 2012–13)* in the GoI thinking towards the issue of land reforms—a clear three step policy looks emerging:

(i) Mapping land carefully and assigning conclusive title,

(ii) Devising a fair but speedy process of land acquisition, and

(iii) Putting in place a transparent and effective land leasing policy.

Land is probably the single most valuable asset in the country today. Not only could greater liquidity for land allow more resources to be redeployed efficiently in agriculture, it could ease the way for land-utilizing businesses to set up. Perhaps, as important, it could allow land to serve as collateral for credit.

The **National Land Records Modernization Programme** (NLRMP), started in 2008, aims at updating and digitizing land records by the end of the 12th Plan. Eventually, the intent is to move from *presumptive title* (where registration of a title does not imply the owner's title is legally valid) to *conclusive title* (where it does). Important points related to this process may be summarised as follows:

(a) Digitisation will help enormously in lowering the costs of land transactions,

while conclusive title will eliminate legal uncertainty and the need to use the government as an intermediary for acquiring land so as to 'cleanse' title.

(b) Given the importance of this programme, its rollout in various states needs to be accelerated—easier and quicker land transactions will especially help small and medium enterprises that do not have the legal support or the management capacity that large enterprises have.

(c) Prohibitory *land leasing norms* raises the cost to rural-urban migration as villagers are unable to lease their land, and often have to leave the land untilled or leave a family member behind to work on the land. Lifting these restrictions can help the landless (or more efficient landowners) get land from those who migrate, even while it will allow landowners with education and skills to move to industry or services.

(d) Compulsory registration of leaseholds and of the owner's title would provide tenants and landowners protection. For such a leasing market to take off, owners should be confident that long–term tenancy would not lead to their losing ownership. With a vibrant leasing market, and clear title, there should be little reason for not strengthening ownership rights.

(e) For large projects with a public purpose, such as the National Industrial and Manufacturing Zones, which will facilitate the setting up of small and medium enterprises—large-scale land acquisition may be necessary.

(f) Given that the people currently living on the identified land will suffer significant costs including the loss of property and livelihoods, a balance has to be drawn between the need for economic growth and the costs imposed on the *displaced.*

Moving onwards, the GoI passed the *Land Acquisition Bill, 2013*. The bill, besides proposing to amend the *Land Acuisition, Rehabilitation and Resettlement Act, 2011* proposed to put in place a transparent, effective and speedy laws reagrding the need of land reforms related to leasing and acquisition. By **2015**, the new government at the Centre proposed a new land bill *(Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Bill, 2015)* aimed at removing the inadequacies of the Land Act of 2013—the Bill is being opposed by the political parties belonging to the opposition (it is still to be passed by the Parliament, though the government has done around ten amendments to it). The country cannot afford to compromise the economic security of land owners (farmers) in the process of evolving a speedier process of land acquisition—the law dealing with it should be transparent, justified, effective and speedier, too.

Finer points of this *PHASE* can be summed up in the following way:[17]

(a) Leasing seems a better choice in face of the opposition India has seen in recent times from the farmers in different states toward attempts of land acuisition. Again, if the country needs to attract investment from the organised private sector (domestic or foreign) land leasing seems a better option than acquisition.

17. The discussion is based on several volumes of the **Economic Survey** and **India** between the period 2010 to 2015 and the **12th Plan**.

(b) Corporate farming has not taken place in the country at a big scale, specially in the areas of foodgrains production which India needs to ensure food security and compete in the global grain market in particular and the agrimarket in general. This has become even more important in wake of the Right to Food given to a large segment of the population.

(c) Giving primacy to 'leasing' will solve several problems:

(i) It will keep land ownership in the hands of the existing farmers;

(ii) It will prevent mass landlessness and unemployment among the farmers;

(iii) Farmers will get a permanent source of income (in the meantime, they might be imparted skills and provide better employment in industries); and

(iv) It will make land easily available for the use of public and private purposes.

(d) In wake of the process of globalisation if the country intends to bring in benefits to agriculture sector it needs to enhance its agriculture production to surplus levels—and for this India needs to garner in the investment potential of the private sector. This cannot happen till the country is able to bring out an effective land leasing and acquisition policies.

(e) The recent emphasis on the promotion of the 'manufacturing sector' and 'smart cities' are hugely dependent on smoother and speedier process of land acquisition. Without expanding the industrial sector to its optimum levels, the agriculture sector can emerge a remunerative profession—the country needs to migrate the extra labour force of the agriculture sector to industry, smoothly.

(f) The issue of land acquisition is to establish a logical equation with 'environmental issue', in order to make the process of development sustainable (NITI Aayog gives a right call for it).

It should be noted that while the GoI has changed its orientation towards the issue of land reforms, the states of India are still trying to accelerate and continue the process of land reforms of *PHASE I* (but due to enough resistance from the land-owning section in the country, the process does not seem happening, politically).

AGRICULTURE HOLDINGS

The average size of land holding in India is continuously decreasing due to rapid and high population growth. The continuous division and fragmentation of holdings has increased the number of holdings, obviously of smaller size. As per the latest (9th) *Agriculture Census 2010–11*:

(i) The total number of operational holdings in the country has increased from 129 million in 2005–06 to 138 million 2010–11 (an increase of 6.61 per cent).

(ii) There is a marginal increase in the operated area from 158.32 million hectare (ha) in 2005–06 to 159.18 million ha in 2010-11 (an increase of 0.54 per cent). The operated area has primarily increased because the State of Jharkhand participated for the *first time* in Agriculture Census 2010–11 (since the state came into being in the year 2000).

(iii) The *average size* of operational holding has declined to 1.16 ha in 2010–11 as compared to 1.23 in 2005–06.

(iv) The percentage share of *female* operational holders has increased from 11.70 in 2005–06 to 12.79 in 2010–11, with the corresponding operated area of 9.33 and 10.36.

(v) The *small* and *marginal* holdings taken together (below 2.00 ha) constitute **84.97** per cent in 2010–11 against 83.29 in 2005–06 with a share of 44.31 per cent in the operated area in the current Census as against the corresponding figure of 41.14 per cent in 2005–06.

(vi) The *large* holdings (10.00 ha & above) were 0.73 per cent of the total number of holdings in 2010–11 with a share of 10.92 per cent in the operated area as against 0.85 per cent and 11.82 per cent respectively for 2005–06 Census.

(vii) Share of different *social groups* in operational holdings stands as—12.40 per cent for **SCs**, 8.71 per cent for **STs**, 0.18 per cent for institutional and 78.72 per cent for others.

(viii) In a total of **137.76** million *operational holdings* in the country, the highest number belonged to Uttar Pradesh (22.93 million) followed by Bihar (16.19 million) and Maharashtra (13.70 million).

(ix) Out of a total of **159.18** million hectares *operated area* in the country, the highest contribution was made by Rajasthan (21.14 million ha) followed by Maharashtra (19.84 million ha) and Uttar Pradesh (17.09 million ha).

Agricultural holdings have been classified into ***three*** categories:

1. Economic Holding

It is that holding which ensures a minimum satisfactory standard of living in a family. In other words, economic holding is a minimum essential area for profitable agriculture.

2. Family Holding

Family holding is that holding which gives work to an average size family having one plough under traditional farming system. In other words, family holding is a ***'plough unit'*** which is neither less nor more for an average size family to cultivate it properly.

3. Optimum Holding

Maximum size of the holding which must be possessed and owned by a family is called optimum holding.

GREEN REVOLUTION

It is the introduction of new techniques of agriculture which became popular by the name of Green Revolution (GR) in early 1960s—at first for ***wheat*** and by the next decade for ***rice***, too. It revolutionised the very traditional idea of food production by giving a boost by more than 250 per cent to the productivity level.[18] The Green Revolution was centred around the use of the High Yielding Variety (HYV) of seeds developed by the US agro-scientist Norman Borlaug doing research on a British Rockfellor Foundation Scholarship in Mexico by the early 1960s. The new wheat seeds which he developed *in vivo* claimed to increase its productivity by more than 200 per cent. By 1965, the seeds were successfully tested and were being used by farmers in food deficient countries such as Mexico, Taiwan.

COMPONENTS OF THE GREEN REVOLUTION

The Green Revolution was based on the timely and adequate supply of many inputs/components. A brief review on the Green Revolution is given below:

18. ***Consultative Group on International Agricultural Research*** (CGIAR), World Bank, Washington DC, 1971.

1. The HYV Seeds

They were popularly called the '***dwarf*** variety of seeds, with the help of repeated mutations, Mr. Borlaug had been able to develop a seed which was raised in its nature of nutrients supplied to the different parts of the wheat plant—against the leaves, stem and in favour of the grain. This made the plant dwarf and the grain heavier—resulting into high yield.[19]

These seeds were non-photosynthetic, hence non-dependent on sun rays for targeted yields.

2. The Chemical Fertilizers

The seeds were to increase productivity provided they got sufficient level of nutrients from the land. The level of nutrients they required could not be supplied with the traditional compostes because they have low concentration of nutrients content and required bigger area while sowing—it meant it will be shared by more than one seed. That is why a high concentration fertilizer was required which could be given to the trageted seed only—the only option was the chemical fertilizers—urea (N), phosphate (P) and potash (K).[20]

3. The Irrigation

For controlled growth of crops and adequate dilution of fertilizers, a controlled means of water supply was required. It made two important compulsions—firstly the area of such crops should be at least free of flooding and secondly, artificial water supply should be developed.[21]

4. Chemical Pesticides and Germicides

As the new seeds were new and non-acclimatised to local pests, germs and diseases than the established indigenous varieties, use of pesticides and germicides became compulsory for result-oriented and secured yields.

5. Chemical Herbicides and Weedicides

To prevent costlier inputs of fertilisers not being consumed by the herbs and the weeds in the farmlands, herbicides and weedicides were used while sowing the HYV seeds.

6. Credit, Storage, Marketing/Distribution

For farmers to be capable of using the new and the costlier inputs of the Green Revolution, availability of easy and cheaper credit was a must. As the farmlands suitable for this new kind of farming was region-specific (as it was only Haryana, Punjab and western Uttar Pradesh in India) storage of the harvested crops was to be done in the region itself till they were distributed throughout the country. Again, the countries which went for the Green Revolution were food-deficient and needed the new yield to be distributed throughout the country and a proper chain of marketing, distribution and transport connectivity was necessary. All these peripheral infrastructure were developed by the countries going for the Green Revolution with softer loans coming from the World Bank—India being the biggest beneficiary.[22]

IMPACT OF THE GREEN REVOLUTION

The Green Revolution had its positive as well as negative socio-economic and ecological impacts on the countries around the world, we will specially study India here:

19. ***International Maize and Wheat Improvement Centre*** (CIMMYT), Mexico, 1971.
20. This made it compulsory to use highly concentrate chemical fertilisers, pushing the traditional organic fertilisers (i.e., composte) out of fashion.
21. This was the reason why the GR was implemented firstly in the rainfall deficient regions of India i.e., Haryana, Punjab and western Uttar Pradesh.
22. ***India 2002,*** Pub. Div., GoI, N. Delhi.

1. Socio-economic Impact

Food production increased in such a way (wheat in 1960s and rice, by 1970s) that many countries became self-sufficient (self sufficiency of food must not be confused with the idea of food security) and some even emerged as food exporting countries.

But the discrepancy in farmers' income, it brought with itself increased the inter-personal as well as inter-regional disparities/inequalities in India.[23] Rise in the incidence of malaria due to water-logging, a swing in the balanced cropping patterns in favour of wheat and rice putting pulses, oilseeds, maize, barley on the margins, etc., were negative impacts.

2. Ecological Impact

The most devastating negative impact of the Green Revolution was the ecological one. When the issues related with it were raised by the media, scholars, experts and environmentalists, neither the governments nor the masses (what to say of the farmers of the GR region— they were not educated enough to understand the side effects of the inputs of the GR) were convinced. But a time came when the government and other government agencies both started doing studies and surveys focused around the ecological and environmental issues. The major ones among them may be glanced in their chronological order:

(i) Critical Ecological Crisis: On the basis of on-field studies[24] it was found that critical ecological crises in the GR region are showing up—

(a) *soil fertility being degraded* (due to the repetitive kind of cropping pattern being followed by the farmers as well as the excessive exploitation of the land; lack of a suitable crop combination and the crop intensity, etc.).

(b) *Water table falling down* (as the new HYV seeds required comparatively very high amount of water for irrigation—5 tonnes of water needed to produce 1 kg of rice.

(c) *Environmental degradation* due to excessive and uncontrolled use of chemical fertilizers, pesticides and herbicides have degraded the environment by increasing pollution levels in land, water and air. In India it is more due to *deforestation* and extension of cultivation in ecologically fragile areas. At the same time, there is an excessive pressure of animals on forests—mainly by goats and sheeps).

(ii) Toxic Level in Food Chain: Toxic level in the food chain of India has increased to such a high level that nothing produced in India is fit for human consumption. Basically, unbridled use of chemical pesticides and weedicides and their industrial production combined together had polluted the land, water and air to such an alarmingly high level that the whole food chain had been a prey of high toxicity.

CONCLUSION

The above studies and the reports were eye-openers in the area of ecologically non-sustainable kind of agriculture as well as a big question mark on it. This was the time when agro-scientists suggested for a really 'green' (eco-friendly) green revolution, which is today known among the experts with many more names—the *evergreen revolution,* the *second*—green revolution the *green farming.*

23. Various ***Economic Surveys,*** specially 1985–86 to 1994–86 to 1994–95, GoI, N. Delhi.
24. Based on various empirical studies in the 1990s conducted separately by ***Vandana Shiva, C.H. Hanumantha Rao, ICAR, Planning Commission, etc.***

CROPPING PATTERNS

The set and combination of crops which farmers opt for in a particular region, in their farm practices, is cropping pattern of the region. Multiplicity of cropping systems has been one of main features of Indian agriculture and it is attributed to rainfed agriculture and prevailing socio-economic situations of farming community.

The cropping pattern in India has undergone significant changes over time. As the cultivated area remains more or less constant, the increased demand for food, because of increase in population and urbanisation, puts agricultural land under stress resulting in *crop intensification* and *crop substitution* of food crops with commercial crops.

Cropping systems of a region are decided by and large, by a number of soil and climatic parameters, which determine overall agro-ecological setting for nourishment and appropriateness of a crop or set of crops for cultivation. Nevertheless, at farmers' level, potential productivity and monetary benefits act as guiding principles while opting for a particular crop or a cropping system. These decisions with respect to choice of crops and cropping systems are further narrowed down under influence of several other forces related to infrastructure facilities, socio-economic and technological factors, all operating interactively at micro-level. These factors are:

(i) Goegraphical factors: Soil, landforms, precipitation, moisture, altitude, etc.

(ii) Socio-cultural factors: Food habits, festivals, tradition, etc.

(iii) Infrastructure factors: Irrigation, transport, storage, trade and marketing, post-harvest handling and processing, etc.

(iv) Economic factors: Financial resource base, land ownership, size and type of land holding, household needs of food, fodder, fuel, fibre and finance, labour availability, etc.

(v) Technological factors: Improved varieties of seeds and plants, mechanisation, plant protection, access to information, etc.

PREVALENT CROPPING SYSTEMS

Multiplicity of cropping systems has been one of the main features of Indian agriculture. This may be attributed to following two major factors:

(i) Rainfed agriculture still accounts for over 92.8 million hectare or 65 per cent of the cropped area. A large diversity of cropping systems exists under rainfed and dryland areas with an over-riding practice of intercropping, due to greater risks involved in cultivating larger area under a particular crop.

(ii) Due to prevailing socio-economic situations (such as, dependency of large population on agriculture, small land-holding size, very high population pressure on land resource, etc.).

Improving household food security has been an issue of supreme importance to many million farmers of India, with the following farm holdings—

(a) 56.15 million marginal (<1.0 hectare),

(b) 17.92 million small (1.0–2.0 hectares), and

(c) 13.25 million semi-medium (2.0–4.0 hectares).

They together are 90 per cent of 97.15 million operational holdings. An important consequence of this has been that crop production in India remained to be considered, by and large, a *subsistence* rather than *commercia*l activity. One of the typical characteristics of subsistence farming is that most of the farmers resort to grow a number of crops on their farm holdings, primarily to fulfil their household needs and follow the practice

of rotating a particular crop combination over a period of 3–4 year interchangeably on different farm fields.

Under influence of all above factors, cropping systems remain dynamic in time and space, making it difficult to precisely determine their spread using conventional methods, over a large territory. However, it has been estimated that more than **250** double cropping systems are followed through out the country. Based on rationale of spread of crops in each district in the country, ***30 important cropping systems*** have been identified—rice-wheat, rice-rice, rice-gram, rice-mustard, rice-groundnut, rice-sorghum, pearlmillet-gram, pearl millet-mustard, pearl millet-sorghum, cotton-wheat, cotton-gram, cotton-sorghum, cotton-safflower, cotton-groundnut, maize-wheat, maize-gram, sugarcane-wheat, soybean-wheat, sorghum-sorghum, groundnut-wheat, sorghum-groundnut, groundnut-rice, sorghum-wheat, sorghum-gram, pigeonpea-sorghum, groundnut, sorghum-rice, groundnut-sorghum and soybean-gram.

CHANGES IN THE CROPPING PATTERNS

Due to various reasons, the cropping pattern of Indian farmers have undergone changes over the time—we can see them in following three phases:

Pre-Green Revolution period: In this phase we see Indian farmers going in for a cropping system (generally), which was primarily decided by the socio-cultural and economic factors—more or less they were closer to being *sustainable* as they had developed through the long process of the trial and error process of their forefathers. A combination of crops we see being grown by farmers across the country with judicious mixture of crops till the Green Revolution. This was a period of subsistence farming with high dependency of population for livelihood on it. The nature of the cropping pattern was too stubborn to change by incentives.

Green Revolution period: Under the spell of the New Agricultural Strategy (NAS), more popular as the Green Revolution (GR), since 1965 onwards, we see a *major shift* in the cropping pattern of Indian farmers. The main forces of change were economic, infrastructural and technological. Initiation of high yeilding varieties of seeds, financial supports of chemical and other inputs together with the provisions of minimum support price (MSP) gave major shift to the farmers' choices of crops. In GR regions we see a highly repetitive kind of cropping pattern with the 'wheat-rice' having predominance. In coming times, the GoI started announcing MSPs for many other crops, which had its own impact on the farmers' choices of crops in their cropping systems.

This period was primarily guided by the singular objective of attaining self-sufficiency in food, which may lead the nation to attain food security. By the late 1980s, India was able to manage self-sufficiecy in foodgrains. We see emergence of big farmers in the GR regions for whom at least farming did not remain subsitence —*commercial dimension* enters the Indian farm practices, for the first time.

This is the period when the traditional cropping pattern of India got exposed to new inputs of farming and geographical dimensions of crop selection were undermined. Soon (by 1996–97), the government came to know that the GR farm practices were ecologically damaging and unsustainable. The GoI officially adopts the idea of *sustainable* agriculture by 1997.

Reform period: Another wave of change in cropping pattern comes with the process of economic reforms commencing in 1991, which brings in new opprotunities together with the challenges in the area of farm sector:

- The issue of food security continued to give in pressure on policymakers as the foodgrains production was not able to

keep pace with the population growth rate. The situation becomes even more serious with Food Rights (NFSA) given to a large population of the country recently.

- Globalisation brought in new opportunities of farm exports together with the challenge of cheap production (need of farm mechanisation and commercial farming so that Indian farm products can compete in the global market) in wake of the agricultural provisions of the World Trade Organisation. It made India think of mobilising huge investments in the sector. India accepts agriculture as an industry (2000) giving green signal to *corporate* and *contract* farmings.
- Ecologically sustainable farming becomes the need of the hour due to ensuing danger of climate change and environment related constraints.
- The GoI proposes for the Second Green Revolution in 2002 with inclusion of the genetically modified foods (GMFs).

In wake of the above-cited factors, experts and the governments expect a major change coming in the cropping patterns of the country. Now, the issue is, as how to face up the emerging challenges together with making farm practices and cropping patterns sustainable—experts suggested the following steps (by late 1990s), which were discussed and almost accepted by the Planning Commission together with the Ministry of Agriculture:

(i) Putting in place the right kind of agricultural policy with the provisions of prize and punishment inclining farmers to go for the right kind of cropping pattern.

(ii) Evolving the right trade policy, which can protect Indian farm products from the negative global competition and enable to expand exports.

(iii) Bringing in proper labour laws, land leasing and acquisition policies to encourage the entry of Indian and foreign private sector in the agriculture sector of the country.

(iv) Keep pressurising the WTO so that a neutral and judicious regime of agricultural provisions are evolved by it accepting the realities of India's susbsistence farming and issues related with the high agriculture subsidies, which developed countries forward to their farm sector.

(v) Evolving the right environment of policy framework for the initiation of GMFs in farm sector and promotion to the non-GMF related reasearch and development in the country—by encouraging the corporate sector.

(vi) Factoring in the issue of environment and climate change in the domain of agricultural policy framework.

(vii) Emphasising the need of farmers' awareness and education for the changing times. For this the PRIs involvement will be crucial.

(viii) Attending to issues like plant protection, checking farm wastage, pest management, commercial production and commercial availality of the green inputs.

(ix) Evolving the right kind of credit and insurance policies for the farm sector at macro and micro levels.

(x) Immediate inclusion of other factos in the farm sector like, a national market for agricultural products, upstream and downstream requirements, proper supply chain management, logistics, agro-processing industries, storage, etc.

ANIMAL REARING

The economics of animal rearing plays a very vital role in the country. The agriculture sector in India is predominantly a mixed crop-livestock (animals, birds and fishes) farming system. Animal rearing has always remained an integral part of it. Animal rearing (which includes rearing of cows, camels, buffaloes, goats, pigs, ships, etc.), besides directly contributing to the national income and socio-economic development plays the following **vital functions** in the country:

(i) Supplements family income and generates gainful employment in the rural sector;

(ii) Particularly helps the landless labourers, small and marginal farmers and women (economic empowerment of women);

(iii) Provides cheap nutritional food;

(iv) Functions as the best insurance against drought, famine and other natural calamities;

(v) It is more *inclusive* in nature; and

(vi) Promotes the cause of *sustainable* agriculture.

The **significance** of this sector can be seen by the following facts:

(a) The livestock sector as a whole achieved an average growth rate of 4.8 per cent during the *11th Plan* which is *higher* than the farm sector growth (3.5 per cent) and the foodgrains growth (around 1 per cent).

(b) The livestock population of India is around 530 million. It accounts for about 26 per cent of the total agricultural, fishing and forestry sector.

(c) Meat production has a growth rate of 5.7 per cent with a total production of 4.8 million tonne (still this sector has huge demand-supply gap and scope of expansion is too much there).

Dairy Sector: India ranks first in the world in milk production with a production of around 133 million tonne and the per capita availabilty (pca) of 297 grams (world pca is 290 grams) by the end of 2014–15.

Some of the important GoI programmes/schemes for meeting the growing demand of milk:

- Intensive Dairy Development Programme.
- Strengthening Infrastructure for Quality and Clean Milk Production, Assistance to Cooperatives.
- Dairy Entrepreneurship Development Scheme.
- National Project for Cattle and Buffalo Breeding.

A new scheme, the *National Dairy Plan*, Phase I, has been launched in March 2012 with the following objectives:

- improving productivity of milch animals,
- strengthening and expanding village-level infrastructure for milk procurement, and
- providing producers greater access to the market in the dairy sector.

Pig Rearing Scheme: This scheme is aimed to assist farmers/landless labourers/co-operatives and the tribals particularly in North-Eastern states by raering pigs under stall fed condition for quality pork production and organised pork marketing in rural areas and semi-urban areas. The main objectives of the shceme are:

- Encouraging commercial rearing by adopting scientific methods and infrastructure creation;
- Production and supply of improved germ plasm;
- Organizing stakeholders to popularize scientific practices;
- Create supply chain for the meat industry;
- Encouraging the value addition for better income.

Adequate availability of *feed and fodder* for livestock is vital for increasing milk production and sustaining the ongoing genetic improvement programme. Green fodder shortage in the country is estimated at about 34 per cent. The central government has put in place a modified Centrally Sponsored Fodder and Feed Development Scheme since 2010 to supplement the efforts of the states to improve fodder production. Besides, the Accelerated Fodder Development Programme was launched as a component of the Rashtriya Krishi Vikas Yojana in 2011–12 to promote production of fodder.

Animal Health: With the improvement in the quality of livestock through launching of extensive cross-breeding programmes, the susceptibility to various diseases including exotic diseases has increased. In order to reduce morbidity and mortality, efforts are being made by the state/UT governments to provide better health care through Polyclinics/Veterinary Hospitals/Dispensaries/ First-Aid Centres including Mobile Veterinary Dispensaries. For the prevention of various diseases 27 veterinary vaccine production units are working with dominance of the public sector (20 are public sector and rest in private sector). The 'Livestock Health & Disease Control' is being run as a centrally sponsored scheme to assist the attempts of the states and UTs in the area.

Suggestions for further development of the sector:

- Developing progeny tested semen for artificial insemination.
- Expansion of fodder availability through innovative means.
- Facilities of animal health centres need to be upgraded and the disease control systems made more effective on the veterinary side.
- In the drylands and mountain ecosystems, livestock contribute anywhere between 50 to 75 per cent of total household income of the rural population. Support to these massive and highly diverse livestock populations in these regions is lacking.
- Raising the capability of the rural poor to conserve and manage their livestock resources, and enables them to derive sustainable incomes from these resources.
- Decentralisation and convergence of policy support for these options is crucial for diversification of livelihoods in small-holder farming.

FOOD MANAGEMENT

Managing enough food in the domestic market has been the prime focus of the governement since Independence. Meeting the physical target of food together with the challenge of enabling Indians to procure food for their consumption was also there. Over the year, we see the government devising various ways and means to handle the twin challenges. Once, the country joined the WTO, a new need was felt—producing surplus and competing with the world out there so that the benefits of globalisation could be reaped by the agriculture sector, too. This section mainly discusses the challenge of food.

MINIMUM SUPPORT PRICE

Minimum Support Price (MSP) is a form of market intervention by the GoI to insure agricultural producers against any sharp fall in farm prices —a guarantee price to save farmers from distress sale. The MSPs are announced at the beginning of the sowing season for certain crops on the basis of the recommendations of the Commission for Agricultural Costs and Prices (CACP, 1985). The major objectives are to support the farmers from distress sales and to procure food grains for public distribution. In case the market price for the

commodity falls below the announced minimum price due to bumper production and glut in the market, government agencies purchase the entire quantity offered by the farmers at the announced minimum price.

Commencing with 'wheat' for the 1066-67, currently the MSPs are announced for **24** commodities including seven cereals (paddy, wheat, barley, jowar, bajra, maize and ragi); five pulses (gram, arhar/tur, moong, urad and lentil); eight oilseeds (groundnut, rapeseed/mustard, toria, soyabean, sunflower seed, sesamum, safflower seed and nigerseed); copra, raw cotton, raw jute and virginia flu cured (VFC) tobacco. The MSPs are fixed at *incentive level*, to fulfil the following purposes:

(a) to induce more investment by the farmers in the farm sector,

(b) to motivate farmers to adopt improved crop production technologies, and

(c) to enhance production and thereby farmers income.

In the absence of such a guaranteed price, there is a concern that farmers may shift to other crops causing shortage in these commodities. The agricultural price policy in India emerged in the backdrop of *food scarcity* and *price fluctuations* provoked by *drought, floods* and *international prices* for exports and imports.[25]

MARKET INTERVENTION SCHEME

The Market Intervention Scheme (MIS) is similar to MSP which is implemented on the request of state governments for procurement of perishable and horticultural commodities in the event of fall in market prices. The scheme is implemented when there is at least 10 per cent increase in production or 10 per cent decrease in the ruling rates over the previous normal year. Proposal of MIS is approved on the specific request of State/UT governments, if the state/UT governments is ready to bear 50 per cent loss (25 per cent in case of North-Eastern states) incurred on its implementation.

PROCUREMENT PRICES

In 1966–67, the GoI announced a 'procurement price' for wheat, too–a bit higher than its MSP (the purpose being security of food procurement for requirement of the PDS). The MSP was announced before sowing, while the procurement price was announced before harvesting—the purpose was encouraging the farmers to sell a bit more and get encouraged to produce more. But this increased price hardly served the purpose as a suitable incentive to farmers—it would have been better had it been announced before sowing and not after harvesting. That is why since the fiscal 1968–69 the government announced only the MSP, which is considered the effective procurement price, too.[26]

ISSUE PRICE

The price at which the GoI allows offtake of foodgrains from the FCI (the price at which the FCI sells its foodgrains). The FCI has been fetching huge losses in the form of food subsidies.[27] The foodgrains procured are transported to the godowns of the FCI located across the country (counted in the buffer stock). From here they head to the sale counters—to the TPDS or Open Market Sale. The transportaion, godowning, the cost of maintaining the FCI, carriage losses, etc., make the foodgrains costlier (the additional expenses other than the MSP is known as the 'economic cost of foodgrains'). To make the

25. **New Agricultural Strategy, 1965**; Reports of the **CACP** and **Ministry of Agriculture**, GoI, N. Delhi.
26. **New Agricultural Strategy, 1965**; the **CACP, 1967** and **Ministry of Agriculture**, GoI, N. Delhi.
27. **New Agricultural Strategy, 1965**; Reports of the **CACP** and **Ministry of Agriculture**, GoI, N. Delhi.

foodgrains affordable to the consumers, the issue prices for foodgrains are set lower than the total cost of procurement and distribution—the gap converts into the 'food subsidy'.

BUFFER STOCK

India has a policy of maintaing a minimum reserve of foodgrains (only for wheat and rice) so that food is available throughout the country at affordable prices round the year. The main supply from here goes to the TPDS (the PDS was restructured as the Targeted PDS in 1997) and at times goes for Open Market Sale to check the rising prices, if needed.

The Buffer Stocking norms (of 2005) was revised[28] by the government (by mid-2014) in the backdrop of increased requirement of foodgrains to run the TPDS in the last few years and with the coming into force of the National Food Security Act (NFSA). The new norms are as given below in the table:

REVISED BUFFER STOCK

As on	Existing since April, 2005 (in Million Tonnes)	Revised
1st April	21.2	21.04
1st July	31.9	41.12
1st Oct	21.2	30.77
1st Jan	25.0	21.41

As income levels of the BPL segment grows, in future, the buffer norms for the foodgrains are supposed to be revised downward. But the logic of maintaining such stocks will remain over there for the purpose of market intervention by the government.

DECENTRALIZED PROCUREMENT SCHEME

The decentralised procurement (DCP) scheme was operationalised by the GoI in 1997 (together with the Centre some states also procure foodgrains from the farmers, locally). Under this scheme, the designated states procure, store and also issue foodgrains under TPDS. The difference between the economic cost of the states and the central issue price (CIP) is passed on to the states by the GoI as subsidy. The decentralized system of procurement, helps to cover more farmers under the MSP operations, improves efficiency of the PDS, provides varieties of foodgrains more suited to local taste, and reduces the transportation costs of the FCI.[29]

The GoI urged ***all states*** to adopt the DCP scheme so that costs of distribution can be saved and outreach of price support mechanism to the farmers in hitherto weaker areas can be improved. To overcome the problem of gaps in the flow of information about procurement operations on day-to-day basis, an *Online Procurement Monitoring System (OPMS)* has been evolved for reporting and monitoring on a daily basis, procurement operations for wheat, paddy and coarse grains in the country.

Two decisions[30] of the GoI that will impact procurement and stocks of rice and wheat from are:

(i) To limit procurement from states that are declaring bonus over and above the MSP to the extent of targeted TPDS and other welfare schemes (OWS) requirements. In the case of non-DCP states declaring bonus, the FCI will not take part in MSP operations in those states.

28. **Economic Survey 2014-15**, MoF, GoI, N. Delhi, Vol. 2, p. 85.
29. **Economic Survey 2011-12**, MoF, GoI, N. Delhi.
30. **Economic Survey 2014-15**, MoF, GoI, N. Delhi, Vol. 2, p. 84.

(ii) To cap the percentage of levy on rice at 25 per cent.

STORAGE

The total capacity available for storage of foodgrains as by 2014 was 727 lakh MT, comprising covered godowns of 567 lakh MT capacity and cover and plinth (CAP) facilities of 160 lakh MT capacity. The existing warehousing facility is limited not only in terms of capacity, but also to certain crops. The stockholding capacity has not kept pace with the increase in production and demand for a long time. The challenges of storage have been outlined by the *Economic Survey 2014–15* in the following way:

(a) The CAP of 160 lakh MT capacity cannot be treated as scientific storage.

(b) Public agencies do not have warehouses for proper storage of even half of the wheat and rice procured by them.

(c) In the wake of persistent seasonal inflation in perishables like fruits and vegetables, there was no effective strategy to control inflation on a sustainable basis.

(d) Cold storage capacity for all type of food items is just 29 MT *(Planning Commission 2012)*. The production of potato alone is about 35 MT.

(e) Cold storage facility is available for only 10 per cent of fruits and vegetables produced in India *(Planning Commission 2011)*.

To bridge the gap between the requirement and availability of scientific storage capacity is the immediate need of the hour. For this it is advisable to promote the policies by which private sector investment can be attracted to it.

ECONOMIC COST OF FOODGRAINS

The economic cost of foodgrains consists of three components, namely the MSP including central bonus (the price paid to farmers), procurement incidentals, and the cost of distribution. The economic cost for both wheat and rice witnessed significant increase during the last few years due to increase in MSPs and proportionate increase in incidentals as well as other costs. As per the *Economic Survey 2014–15,* the economic costs of wheat and rice in 2014–15 are estimated to be over Rs. 28 and Rs. 20 per kg, respectively (they were around Rs. 20 and Rs 15 in 2010–11).

High economic cost necessitated a detailed review of the open-ended procurement policy, especially in states that offer high bonus on top of MSP and those that impose high taxes and statutory levies, as well as stocking and distribution policies. In this regard, the government set up a ***High Level Committee (HLC)*** in August 2014 (Shanta Kumar as its Chairman) to suggest inter-alia *restructuring* or *unbundling* of the FCI with a view to improve its operational efficiency and financial management.

OPEN MARKET SALE SCHEME

The FCI has been undertaking sale of wheat at predetermined prices (reserve prices) in the open market from time to time, known as the Open Market Sale Scheme (OMSS). This is aimed at serving the following *objectives:*

(a) to enhance market supply of foodgrains;

(b) to exercise a moderating influence on open market prices; and

(c) to offload surplus stocks.

Under the Open Market Sale Scheme (Domestic), during the year 2014–15, 100 lakh tonnes of wheat was been allocated for sale in

the domestic market. *Deviating from the earlier practice,* this year (i.e., 2015–16) the government has adopted a policy of differential prices to encourage sale of older stock first—sticking to the following policy stance:

(i) Keeping the reserve price above MSP, but reasonably below the acquisition cost or economic cost of wheat, so that the buyers remain attracted to purchase of wheat from the mandis during the harvest season and the market remains competitive.

ii) Maintaining that the market price in the lean season does not increase much and inflation remains under check.

PRICE STABILISATION FUND

The GoI, by late *March 2015,* launched the Price Stabilisation Fund (PSF) as a Central Sector Scheme to support market interventions for price control of perishable agri-hoticultural commodities. The cost to be borne between the centre and states in equal ratio (in case of the North Eastern states, the respective share will be 75:25). The scheme will commence with only two crops, viz., onion and potato.

FOOD SUBSIDY

Food security system of the government has been aimed at *twin objectives*:

(i) Provision of minimum nutritional support to the poor through subsidized foodgrains, and

(ii) ensuring price stability in different states.

In fulfilling its obligation towards distributive justice, the government incurs food subsidy. The programme covers over 65 million BPL households serviced through 4,50,000 fair price shops. While the economic cost of wheat and rice has continuously gone up, the issue price has been kept unchanged since 1 July 2002. On account of implementation of the NFSA, the Central Issue Price (CIP) has further gone down for the APL and BPL categories. The government, therefore, continues to provide large and growing amounts of subsidy on foodgrains for distribution under the TPDS/NFSA and other nutrition-based welfare schemes and open market operations. The food subsidy bill has increased substantially in the past few years putting severe strain on the public exchequer which is estimated to cross Rs. 1,20,000 crores by **2015–16** (from around Rs. 23,000 crores of 2005–06).

FARM SUBSIDIES

Farm subsidies form an integral part of the government's budget. In the case of developed countries, the agricultural or farm subsidies compose nearly 40 per cent of the total budgetary outlay while in India's case it is much lower (around 7.8 per cent of GDP) and of different nature.

Direct farm subsidies: These are the kinds of subsidies in which direct cash incentives are paid to the farmers in order to make their products more competitive in the global markets. The developed countries (USA and Europe) spend huge amounts of their annual budgets on the agriculture, farm and fisheries subsidies. Direct farm subsidies are helpful as they provide the right levels of purchasing power to the farmer and can significantly help in raising the standards of living of the rural poor. They also help in checking the misuse of public funds as they help in the proper identification of the beneficiaries.

Indirect farm subsidies: These are the farm subsidies which are provided in the form of cheaper credit facilities, farm loan waivers, reduction in irrigation and electricity bills, fertilizers, seeds and pesticides subsidy as well as the investments in agricultural

research, environmental assistance, farmer training, etc. These subsidies are also provided to make farm products more competitive in the global market.

The subsidies provided on the fertilizers as 'input' subsidies are in the form of *indirect* subsidies. But if the government does not incentivize the farmer by an effective cost reduction in prices of the fertilizers, but provides direct cash incentives after the produce, is known as a *direct* subsidy.

The World Trade Organization (WTO) has put some ceilings on the amount of direct and indirect subsidies being provided by the various developing and developed nations due to the fact that these subsidies *distort the free market forces* which have their own implications.

First thoughts are encouraging. A panel headed by Montek Singh Ahluwalia (the then Deputy Chairman, *Planning Commission)* recommended that the power ministry, instead of paying power-distribution companies, hand out electricity subsidies **directly** to farmers through a smart card linked to the unique identity number.

India spends about Rs. 1,60,000 crore every year or roughly 2 per cent of its GDP on subsidies, ***all indirectly***. For example, in fertilizers, which accounts for two-thirds of total subsidies, the government fixes a low selling price and compensates the producers by paying the difference between the selling price and the actual production costs (plus a pre-decided profit margin) as subsidy. *Important issues* related to farm subsidies are as given below:

(i) The indirect subsidy has been blamed for benefiting big farmers more than the small and medium farmers, for whom the subsidy is intended. This is because the bulk of the subsidised fertilizers is picked up by the rich farmers, because the small and marginal farmers account for just 37 per cent of the farm land.

(ii) Indirect subsidy has also discouraged improvements in production processes since manufacturers have no incentive to increase efficiency. This will also play a big part in bringing down India's overall subsidy bill. For instance, according to industry estimates, the money spent on poor farmers could potentially come down to Rs. 37,000 crore from the current Rs. 100,000 crore.

(iii) Another advantage of cash subsidies is that it will free up the distribution system and allow the people who receive the subsidy to choose where they buy their goods from. The complexity is not so much in the transfer of funds, as it is in the identification of the beneficiaries.

Other Countries: The idea of disbursing subsidies directly to the beneficiaries is becoming popular among the development thinkers and policymakers. It's already a part of policy in many parts of the world—predominantly, in Latin America where 16 countries have this practice, and also in other countries such as Jamaica, Philippines, Turkey and Indonesia.

The biggest and most cited of such programmes is Brazil's *Bolsa Familia*. It started in 2001, with a programme aimed at education. It expanded in 2003 to include a range of services like food and fuel, and now covers 2.6 million families in that country. The government *transfers cash* straight to a family, subject to conditions such as school attendance, nutritional monitoring, pre-natal and post-natal tests. By many measures, the programme is a success. Brazil's poverty levels dropped by 15 percentage points between 2003 and 2009, at least a sixth, thanks to Bolsa Familia (economic growth played a big part, too.) Millenium Development Goals initiative, which in 2000 sought to halve poverty by 2015, doesn't even mention cash transfers. But, Brazil achieved the goals 10 years ahead of the deadline. And the cost of these transfers has been 0.4 per cent of GDP.

The big question is not whether a direct cash transfer is the perfect solution, but whether it's an improvement over the existing systems. The evidence—its success in other parts of the world—and the poor performance of indirect subsidies so far would suggest so. Looking at it, the GoI has already started a pan-India scheme to disburse all forms of subsidies derectly, through the ***Direct Benefit Transfer (DBT)*** since 2015–16 onwards.

SUGAR SECTOR REFORMS

India is the largest consumer and second largest producer of sugar after Brazil. Sugar and sugarcane are notified as essential commodities under the Essential Commodities Act 1955. However, the Indian sugar sector suffers from policy inconsistency and unpredictability. The sugar industry in India is over-regulated and prone to *cyclicality* due to price interventions. Deregulation of the sugar industry has been widely debated for a long time. From a purely economic point of view, greater play of market forces would provide better prices and serve the interests of all stakeholders. The government should come into the picture only in situations where absolutely necessary. Export bans and controls could be replaced with small variable external tariffs to stabilize prices. A report on *'Regulation of the Sugar Sector in India: The Way Forward'* has been submitted by the Committee under the chairmanship of Dr. C. Rangarajan, Chairman of the Economic Advisory Council to the Prime Minister. The measures suggested[31] are as follows:

(i) phasing out cane reservation area

(ii) dispensing with minimum distance criteria

(iii) dispensing with the levy sugar system

(iv) states that want to provide sugar under the PDS may procure it from the market according to their requirement, fix the issue price and subsidise from their own budgets (till April 4, 2013, when the GoI 'decontrolled' the sugar industry from the burden of 'levy' to the tune of 10 per cent of their total production, there was an implicit cross-subsidy on account of the levy as sugar mills were under a transition). The report suggested some level of central support to help states meet the cost to be incurred on this account may be provided for a transitory period (which has been announced on April 4, 2013).

(v) dispensing with the regulated release mechanism (of non-levy) sugar

(vi) stable trade policy

(vii) no quantitative or movement restrictions on by-product like molasses and ethanol, and dispensing with compulsory jute packing.

(viii) a stable, predictable and consistent policy reforms to be brought about in a fiscally neutral manner and issues considered for implementation in a phased manner.

In the meanwhile, following on the path of ongoing *'factor market reforms'* the GoI decontrolled the sugar industry in *April 2013*—effective for the 'sugar year' September 2012–August 2013. It abolished the decades-old practice of regulating 'how much sugar a mill can sell in the open market' and the 'levy' system in which a company is forced to sell 10 per cent of the output at a loss to the FCI for supplies through the PDS (Public Distribution System)—they will be no more under the levy obligation. The *next move* of reform may be 'linking sugar and sugarcane prices'. To continue subsidised supply to the poor, states will now have to buy sugar at market rates and maintain the existing PDS sale price.

31. **Economic Survey 2012-13,** MoF, GoI, p. 177

RESTRUCTURING OF FCI

The GoI did set up a High Level Committee (Shanta Kumar as its Chairman) to suggest *restructuring* or *unbundling* of the Food Corporation of India (FCI) with a view to improve its *operational efficiency* and *financial management.* Some of the recommendations have already been implemented by the GoI by now. The **subject-wise** recommendations of the committee are as given below:

ON FCI

(i) The FCI should hand over all procurement operations of wheat, paddy and rice to states that have gained sufficient experience in this regard and have created reasonable infrastructure for procurement. The FCI will accept only the surplus (after deducting the needs of the states under the NFSA) from these state governments (not millers) to be moved to deficit states. The FCI should move on helping those states where farmers suffer from distress sales (prices below MSP), and which are dominated by small holdings.

(ii) Centre should make it clear to states that in case of any bonus being given by them on top of MSP, it will not accept grains under the central pool beyond the quantity needed by the state for its own TPDS and Other Welfare Schemes. This advice has already been notified by the GoI.

(iii) The statutory levies including commissions need to be brought down uniformly to 3 per cent, or at most 4 per cent of MSP, and this should be included in the MSP itself (states losing revenue due to this rationalisation of levies can be compensated through a diversification package for the next three-five years).

(iv) The Government of India must provide better price support operations for pulses and oilseeds and dovetail their MSP policy with trade policy so that their landed costs are not below their MSP.

(v) Cash transfers in TPDS should be gradually introduced, starting with large cities with more than 1 million population —extending it to grain surplus states and then giving deficit states for the option of cash or physical grain distribution.

(vi) The ***new face of the FCI*** will be akin to an agency for innovations in the *food management system* with the primary focus of creating competition in every segment of the foodgrain supply chain, from procurement to stocking to movement and finally distribution under the TPDS, so that overall costs of the system are substantially reduced and leakages plugged and it serves a larger number of farmers and consumers.

ON TPDS AND NFSA

(i) Given that leakages in the TPDS range from 40 to 50 per cent, the GoI should defer implementation of the NFSA in states that have not done end-to-end computerisation; have not put the list of beneficiaries online for anyone to verify; and have not set up vigilance committees to check pilferage from TPDS.

(ii) Coverage of population should be brought down to around 40 per cent.

(iii) BPL families and some even above that be given 7 kg/person.

(iv) On central issue prices (CIP), while Antyodya households can be given grains at Rs. 3/2/1/kg for the time being, but pricing for priority households must be linked to MSP.

ON STOCKING AND MOVEMENT

(i) FCI should outsource its stocking operations to various agencies.

(ii) Covered and plinth (CAP) storage should be gradually phased out with no grain stocks remaining in CAP for more than 3 months.

(iii) Silo bag technology and conventional storages wherever possible should replace CAP.

ON BUFFER STOCKING OPERATIONS AND LIQUIDATION POLICY

(i) The Department of Food and Public Distribution (DFPD)/FCI have to work in tandem to liquidate stocks in Open Market Sale Scheme (OMSS) or in export markets, whenever stocks go beyond the buffer stock norms. A transparent liquidation policy is the need of hour, which should automatically kick-in when FCI is faced with surplus stocks than buffer norms.

(ii) Greater flexibility to FCI with business orientation to operate in OMSS and export markets is needed.

ON DIRECT SUBSIDY TO FARMERS

(i) Farmers be given direct cash subsidy (of about Rs 7000/ha) and fertilizer sector can then be deregulated.

ON END-TO-END COMPUTERIZATION

(i) To go for total end-to-end computerisation of the entire *food management system,* starting from procurement from farmers, to stocking, movement, and finally distribution through the TPDS.

AGRICULTURE MARKETING

India's grimarket is presently regulated by the Agricultural Produce Market Committee (APMC) Act enacted by the state governments. There are about 2,477 principal regulated agrimarkets and 4,843 sub-market yards regulated by the respective APMCs in India. Thus, India has not one, not 29 (number of states) but thousands of agricultural markets. This Act notifies agricultural commodities produced in the region such as cereals, pulses, edible oilseed, fruits and vegetables and even chicken, goat, sheep, sugar, fish, etc., and provides that first sale in these commodities can be conducted only under the aegis of the APMC through the commission agents licensed by the APMCs set up under the Act.

The typical *amenities* available in or around the APMCs are: auction halls, weigh bridges, godowns, shops for retailers, canteens, roads, lights, drinking water, police station, post-office, bore-wells, warehouse, farmers amenity center, tanks, water treatment plant, soil-testing laboratory, toilet blocks, etc. Various taxes, fees/ charges and cess levied on the trades conducted in the *mandis* are also notified under the Act.

As per the *Economic Survey 2014–15,* the APMCs of the states levy multiples fees of substantial magnitude which are non-transparent and hence work as a source of political power. The functioning of the APMCs have always been a matter of debate among experts and policymakers alike—**major issues** being the following:

- They charge a market fee of buyers, and they charge a licensing fee from the commissioning agents who mediate between buyers and farmers.
- They also charge small licensing fees from a whole range of functionaries (warehousing agents, loading agents, etc.).

- In addition, commissioning agents charge commission fees on transactions between buyers and farmers.
- The levies and other market charges imposed by states vary widely. Statutory levies/mandi tax, VAT, etc., are a major source of market distortion.
- Such high taxes at the first level of trading have significant cascading effects on commodity prices, as the commodities passes through the supply chain. For rice, these charges can be as high as 14.5 per cent in Andhra Pradesh (excluding the state VAT) and close to 10 per cent in Odisha and Punjab.
- Even the model APMC Act (described below) treats the APMC as an arm of the state, and, the market fee, as the tax levied by the state, rather than fee charged for providing services. This is a crucial provision which acts as *a major impediment to creating national common market* in agricultural commodities. Removal of this provision will pave the way for creating competition and a national common market for agricultural commodities.
- Moreover, though the market fee is collected just like a tax, the revenue earned by the APMCs does not go to the state exchequer and hence does not require the approval of State legislature to utilise the funds so collected. Thus APMC operations are hidden from scrutiny.
- The rate of commission charged by the licensed commission agents is exorbitant, because, unlike direct taxes, which are levied on net income, the commission is charged on the entire value of the produce sold. The license fee charged from various market licensed operators is nominal, but the small number of licences granted creates a premium, which is believed to be paid in cash.
- There is a perception that the positions in the market committee (at the state level) and the market board – which supervises the market committee – are occupied by the politically influential persons. They enjoy a cosy relationship with the licensed commission agents who wield power by exercising monopoly power within the notified area, at times by forming cartels. The resistance to *reforming* APMCs is perceived to be emanating from these factors.

The scope of the *Essential Commodities Act, 1955* (EC Act) is much broader than the APMC Act. It empowers the central and state governments concurrently to control production, supply and distribution of certain commodities, including pricing, stock-holding and the period for which the stocks can be kept and to impose duties. The APMC Act on the other hand, controls only the first sale of the agricultural produce. Apart from food-stuffs which are covered under the APMC Act, the commodities covered under the EC Act generally are: drugs, fertilisers, and textiles and coal.

MODEL APMC ACT

Since the State APMC Acts created fragment markets for agricultural commodities and curtailed the freedom of farmers to sell their produce other than through the commission agents and other functionaries licensed by the APMCs, the Ministry of Agriculture (GoI) developed a *Model APMC Act, 2003* and has been pursuing the state governments to modify their respective Acts along it. The Model APMC Act provides the following new things:

(i) Direct sale of farm produce by the farmer to contract farming sponsors;

(ii) Setting up 'Special markets' for 'specified agricultural commodities'—mostly perishables;

(iii) Permits private persons, farmers and consumers to establish new markets for agricultural produce in any area;

(iv) A single levy of market fee on the sale of notified agricultural commodities in any market area;

(v) Replaces licensing with registrations of market functionaries which would allow them to operate in one or more different market areas;

(vi) Establishment of consumers' and farmers' markets to facilitate direct sale of agricultural produce to consumers;

(vii) Creation of marketing infrastructure from the revenue earned by the APMC;

(viii) Provides some freedom to the farmers to sell their produce directly to the contract-sponsors or in the market set up by private individuals, consumers or producers;

(ix) Increases the competitiveness of the market of agri-produce by allowing common registration of market intermediaries.

Many of the states have partially adopted the provisions of model APMC Acts and amended their APMC Acts. Some of the states have not framed rules to implement the amended provisions, which indicate *hesitancy* on the part of state governments to liberalise the statutory compulsion on farmers to sell their produce through APMCs. Some states (such as Karnataka)[32] have however adopted changes to create greater competition within the state—popularly known as the ***Karnataka Model***.

Karnataka has integrated its 51 of the 155 main market yards and 354 sub-yards into a single licensing system. *Rashtriya e-market Services Ltd. (ReMS),* a joint venture created by the state government and NCDEX Spot Exchange, offers automated auction and post auction facilities (weighting, invoicing, market fee collection, accounting), assaying facilities in the markets, facilitate warehouse-based sale of produce, facilitate commodity funding, price dissemination by leveraging technology. The wider geographical scope afforded by breaking up fragmented markets has enabled private sector investment in marketing infrastructure.

The provisions of the Model APMC Act do not go far enough to create a national or even state level common market for agricultural commodities as it has several inadequacies. These ***inadequacies*** have been highlighted by the *Economic Survey 2014–15* in the following way:

- The model APMC Act retains the mandatory requirement of the buyers having to pay APMC charges even when the produce is sold directly outside the APMC area, say, to the contract sponsors or in a market set up by private individuals even though no facilities provided by the APMC is used.
- The relevant provision in the model APMC Act is, 'power to levy market fee' (single point levy)—"every market shall levy market fee on the sale or purchase of notified agricultural produce, whether brought from within the State or from outside the State into the market area."
- The model APMC Act bars the APMCs and commission agents from deducting the market fee/commission from the seller, but the incidence of these fees/

32. Other states like Maharshtra, Tamil Nadu and Andhra Pradesh did also go for reforms in their APMCs taking clues from the Model APMC Act – making these states also to have some synergy coming into their agriculture market.

commission falls on the farmers since buyers would discount their bids to the extent of the fees/commission charged by the APMC and the Commission agents.

- The model APMC Act provides for setting up of markets by private sector, but this provision is not adequate to create *competition* for APMCs even within the state, since the owner of the private market will have to collect the APMC fees/taxes, for and on behalf of the APMC, from the buyers/sellers in addition to the fee that he wants to charge for providing trading platform and other services, such as loading, unloading, grading, weighing etc.

The *Economic Survey 2014–15* goes to the extent of using Constitutional provisions to set up a common agrimarket—in a way, suggesting the Centre to use its power to override the states' power on the APMC as the subject falls in the Concurrent List. But this approach could be seen as heavyhanded on the part of the Centre and contrary to the new spirit of *cooperative federalism*.

The central government is closely working with state governments to re-orient states' APMC Acts to provide for establishment of private market yards/private markets. As per the *Economic Survey 2014–15*, some of the **recent initiatives** taken in this regard are as follows:

(i) A comprehensive advisory issued to states to go beyond the provisions of the Model Act and declare the entire state a *single market* with one licence valid across the entire state and removing all restrictions on movement of agricultural produce within the state.

(ii) To promote development of a *common national market* for agricultural commodities through ***e-platforms***, a central-sector scheme for Promotion of National Agricultural Market through Agri-Tech Infrastructure Fund (ATIF) has been lauched—to be implemented by 2016–17.

(iii) On the request of the central government, a number of state governments have exempted the marketing of fruits and vegetables from the purview of the APMC Act. The NCT of Delhi has put fruits and vegetables outside its APMC. The Small Farmers Agribusiness Consortium (SFAC) has taken the initiative for developing a ***Kisan Mandi*** in Delhi with a view to providing a platform to FPOs for direct sale of their produce to prospective buyers totally obviating or reducing unnecessary layers of intermediation in the process. The SFAC plan to scale their activities in other states based on the outcome of the experience of the Delhi kisan mandi.

AGRICULTURAL CREDIT

Three types[33] of loans are provided to Indian farmers to meet their financial requirements—

(i) Short-term loans
(ii) Medium-term loans
(iii) Long-term loans

SHORT-TERM LOANS

Short-term loans are provided for a period of less than 15 months to meet out expenses of routine farming and domestic consumptions. This type

33. Rakesh Mohan, ***'Agricultural Credit in India: Status, Issues and Future Agenda'***, from his lecture delivered at the **17th National Conference of Agricultural Marketing**, Indian Society of Agricultural Marketing, Hyderabad, February 5, 2004 [Rakesh Mohan was the then Deputy Governor, Reserve Bank of India]

of loan is demanded by farmers for purchasing seeds, fertilizers and for meeting out family requirements.

MEDIUM-TERM LOANS

Medium-term loans are provided for a period of 15 months to 5 years to purchase agricultural equipment, animals and for land improvement.

LONG-TERM LOANS

Long-term loans are provided for a period of more than 5 years. This type of loan is taken by the farmers to purchase land and expensive agricultural equipment and for repayment of old loans.

SOURCES OF AGRICULTURAL LOANS

The Indian farmer can acquire the above types of loans from two sources:

(i) Non-institutional sources like moneylenders, landlords, big businessmen, etc.[34]

(ii) Institutional sources like commercial banks, co-operative banks and government sources.

Policy on agriculture credit aims at progressive institutionalisation of credit agencies for providing credit to farmers for raising agricultural production and productivity. Agricultural credit is disbursed through a multi-agency network consisting of co-operatives, commercial banks and regional rural banks (RRBs).

COMMODITY FUTURES MARKET

By mid-2015, out of the 113 commodities notified for futures trading, 43 were actively traded in 4 national exchanges and 6 commodity-specific exchanges. Share of agricultural commodities in the total turnover was over 18 per cent in 2014–15 (up to December 2014), with food items (refined soya oil, soyabean, chana, coriander and rapeseed/mustard seed) contributing over 50 per cent of it. The remaining (81.63 per cent) turnover was contributed by bullion, metals and energy contracts.

A *Committee* set up by the Ministry of Finance, which submitted its report in April 2014 has observed that hedging efficiency of the commodity futures markets is low. In order to ensure that forward markets in commodities are well regulated and the Indian commodity futures market is compliant with international regulatory requirements, the regulatory framework for the commodity futures market needs to be strengthened at the earliest. The GoI decided to merge the commodity market regulator, the Forward Market Commission (FMC) with the Security & Exchange Board of India (SEBI) in **2015–16** with enhanced and effective regulatory power given to it.

UPSTREAM & DOWNSTREAM REQUIREMENTS

'Upstream' and 'downstream' are business terms applicable to the production processes that exist within several industries. Upstream, downstream and midstream make up the stages of the production process for different industries.

Upstream: The upstream stage of the production process involves searching for and extracting raw materials—it does not do anything with the material itself, such as processing the materials. In upstream firms simply find and extract the raw material. Thus, any industry that relies on the extraction of raw materials commonly has an *upstream stage* in its production process. In a more general sense, upstream can also refer to any part of the production process relating to the extraction stages.

34. Known as the Unregulated Credit Market.

Downstream: The downstream stage in the production process involves processing the materials collected during the upstream stage into a finished product. It further includes the actual sale. End users will vary depending on the finished product. Regardless of the industry involved, the downstream process has direct contact with customers through the finished product.

Midstream: Several points in between the two points (the place where raw is extracted and till it reaches the final consumer as finished product) are taken as the midstream. It depends on the reference point as how many or which stage is considered as the midstream by an industry.

Whether an activity is upstream or downstream depends on the point of analysis in a supply chain. A manufacturer considers suppliers as upstream and customers as downstream. Within a manufacturer, control over activities in the supply chain is subject to a company's management. Even so, a manufacturing activity that occurs prior to another is considered an upstream activity. Control over activities outside the company is subject to inter-company negotiations, cooperation and technology. The firms involved in the chain of upstream and downstream processes keep their eyes on several other dimensions, such as *strategies, integration* and *improvement:*

(i) It is important to understand the *strategies* of supply chain partners. A supplier may have a strategy to grow and begin to perform manufacturing functions infringing on other supply chain member's markets. Understanding the incentives of suppliers, as well as customers, helps to plan for these types of changes. In order to remain a powerful player in a supply chain, a company can no longer afford to focus on its own business or those of its competitors, it must understand supply chain members business as if they were their own.

(ii) *Integration* of business processes throughout a supply chain depends on cooperation of members. For example, a manufacturer who decides to sole-source a component with one supplier can control and integrate with the supplier to streamline business processes. Technology can be implemented to make business processes between companies easier to perform. For example, a supplier can change from requiring a purchase order for every delivery to having an open purchase order that simply keeps track of shipments based on material requirements plans from the manufacturing resource planning software of a manufacturer. This type of integration becomes less likely when suppliers serve many manufacturers.

(iii) Manufacturers in a supply chain make 'make-or-buy' decisions that affect the chain. They do this based on cost and scheduling *improvements* available. Manufacturers may also begin using distributors to capture additional markets or decide to concentrate on larger customers whom they can serve directly. All of these types of potential improvements depend on understanding the motivations and incentives of the companies in a supply chain.

Industries, to have a smooth and uniterrupted fuctioning, depend heavily on the upstream and downstream requirements. In case of ***India***, we find several bottlenecks in both the processes:

(a) In case of the private sector, the downstream process seems better. But it is not so. Upto the level of 'wholesale' it is

somewhat organised, but the retail trading is quite fragmented. India's *retail business* remains least organised. Organised retail is yet to evolve in the country, thus, the levels of uncertainities, potential of market access, monitoring and regulation of retail market are too weak.

(b) Upstream processes are also not up-to-the-mark. From the stage where the wholesale comes into picture, things look better. But outsourcing the raw from the local producers is an uphill task in the country. Due to this the upstream segment of the economy has remained too weak and frgamented.

(c) The industrial and manufactured sectors have been managing their upstream and downstream requirements, but their heavy depenence on the unorganised sector is a challenging issue infront of India.

(d) In case of the agricultural products, the situation is even worse. Regulation of the agrimarkets by the APMCs of states has not allowed India to emrge with a common and single market. This has hampered not only the growth and business prospects of the businesses involved in this segment but it has also crippled the agricultural sector in a very serious way. It has taken the heaviest toll on the agriculture sector which still remains a non-remunerative profession.

(e) As India is to compete in the global market, it immediately needs to stregthen it upstream and downstream process. For this, India is advised to pick the best practices from around the world and integrate itself with the developed world with the better ways and the state-of-the-art tools and means.

SUPPLY CHAIN MANAGEMENT

A *supply chain* is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organisations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.

Traditionally, marketing, distribution, planning, manufacturing, and the purchasing organisations along the supply chain operated independently. These organisations have their own objectives and these are often conflicting. Marketing's objective of high customer service and maximum sales conflict with manufacturing and distribution goals. Many manufacturing operations are designed to maximise throughput and lower costs with little consideration for the impact on inventory levels and distribution capabilities. Purchasing contracts are often negotiated with very little information beyond historical buying patterns. The result of these factors is that there is not a single, integrated plan for the organisation—there were as many plans as businesses. Clearly, there is a need for a mechanism through which these different functions can be integrated together. Supply chain management is a strategy through which such an integration can be achieved.

Supply chain management is typically viewed to lie between fully vertically integrated firms, where the entire material flow is owned by a *single firm*, and those where each channel member operates independently. Therefore, coordination between the various players in the chain is key in its effective management. Supply chain management can be compared to a well-balanced and well-practiced 'relay team'—such a team is

more competitive when each player knows how to be positioned for the hand-off. The relationships are the strongest between players who directly pass the baton, but the entire team needs to make a coordinated effort to win the race.

Supply chain management, then, is the active management of supply chain activities to maximise customer value and achieve a sustainable competitive advantage. It represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective and efficient ways possible. Supply chain activities cover everything:

(i) Product development,
(ii) Sourcing,
(iii) Production,
(iv) Logistics, and
(v) Information systems (for proper coordination).

The organisations that make up the supply chain are 'linked' together through *physical* flows and *information* flows. Physical flows involve the transformation, movement, and storage of goods and materials. They are the most visible piece of the supply chain. But just as important are information flows—information flows allow the various supply chain partners to coordinate their long-term plans, and to control the day-to-day flow of goods and material up and down the supply chain.

Upstream & downstream requirements and the supply chain management: Indian scenario & the issues of allowing FDI in it.

This segment of India has seen least organised development, even in the reforms period. Due to lack of proper 'market reforms' in the area of agricultural products (as APMCs of different states have failed to develop) which hampered so many aspects of it—storage, grading, packaging, etc. It is believed that this field needs huge investments from the corporate sector. The corporate sector has not been much attracted to this sector. Main factors for the unwillingness among the private sector to put in their money in it are, scarcity of capital, logistics, experience and non-conducive policy framework of the agriculture market. This is the reason why the GoI has allowed more freedom to Foreign Direct Investment in retail chain development. It is expected that the willing foreign firms will not only bringing the needed fund to the sector but with them India will get international experience and best practices.

To compete in the globalising world markets and to gain economic benefits out of globalisation, India needs the following features in its supply chain management:

(i) An organised retain sector
(ii) Proper levels of logistics
(iii) Fully updated data of raw materials, production, cropping pattern, etc.
(iv) International class packaging, care to wards phyto-sanitary aspects.

It is felt that the above-cited features will be easier to manage for the top global players as they have fund, experience and a willingness to expand their businesses in the growing regions of the world.

To strengthen and broad base the market, the Forward Markets Commission (FMC), which is ***the regulator*** for commodity futures trading under the provisions of the Forward Contracts (Regulation) Act 1952, has taken many initiatives such as:[35]

(i) Conducted awareness programmes in 2011, such as a media campaign under the ***Jago Grahak Jago Programme*** about

35. ***Economic Survey 2011-12,*** op. cit., p. 199.

the Dos and Don'ts of trading in the commodity futures market;

(ii) Police training programmes in the states of Madhya Pradesh, Chhattisgarh, Tamil Nadu and Delhi with regard to dabba trading / illegal trading;

(iii) A massive awareness and capacity-building programme for various stakeholder groups, with primary focus on farmers.

(iv) On the regulatory front, the FMC undertook measures for the development of the commodity futures market, which include ensuring more effective inspection of members of the exchanges on regular basis and in a comprehensive manner covering all aspects of the regulatory regime.

(v) Bringing out a guidance manual for improving audit practices, prescribing penalty structure for client code modification and for executing trade.

(vi) Granting exemptions for short hedge for soyabean/oil futures, issuing directives for segregation of client accounts.

FARM WASTE DEBATE

A recent study,[36] undertaken by the Central Institute of Post-Harvest Engineering and Technology (CIPHET), a government-run institute, has estimated the value of farm waste in India at Rs. 44,000 crore (at the prices of 2009), that is around 7 per cent of the total produce, which is much lower than the oft-stated 40 per cent level. Although cereals, such as wheat and rice, pulses and oil seeds accounted for around two-thirds of the wastage, the loss in case of fruits and vegetables was the highest at up to 18 per cent of the total produce.

Attending the causes of storage and processing facilities, something the GoI is emphasising, this level could come down significantly and can serve great purpose in helping the economy to fight the repeated price shocks of the past two years in case of fruits, vegetables and foodgrains to a great extent.

The losses take place in almost all stages of farming but ***the study*** looked at harvesting, collection, grading, cleaning, packaging, transportation and storage. If cultivation was also included the loss figure would be much higher. The GoI has said that availability of better technology and their adoption has brought about a reduction in losses.

IRRIGATION

The Planning Commission[37] classified irrigation projects/schemes in India on the following lines :

(i) *Major Irrigation Schemes*—those with cultivable command areas (CCA) of more than 10,000 hectares.

(ii) *Medium Irrigation Schemes*—those with cultivable command areas (CCA) between 2,000 and 10,000 hectares.

(iii) *Minor Irrigation Schemes*—those with cultivable command area (CCA) upto 2,000 hectares. Expansion of irrigation facilities, along with consolidation of the existing systems, has been the main part of the strategy for increasing production of foodgrains.

With a view to ensuring early completion of projects for providing irrigation benefits to the farmers, Rural Infrastructure Development Fund

36. ***Central Institute of Post-Harvest Engineering and Technology (CIPHET),*** ICAR, Ministry of Agriculture, GoI, Ludhiana, Study released in September, 2011.

37. ***Planning Commission***, GoI, N. Delhi, 1961.

(RIDF) has been in operation since 1995–96. The government launched the Accelerated Irrigation Benefits Programme (AIBP) in 1996–97 to give loan assistance to the states to help them complete some of the incomplete major/medium irrigation projects, which were in an advanced stage of completion.

NATIONAL FOOD SECURITY MISSION (NFSM)

The NFSM, launched in 2007, is a **crop development** scheme of the Government of India that aims at additional production of 10, 8 and 2 million tonnes of rice, wheat and pulses, respectively by the end of 2011–12. The mission interventions consist of:[38]

(i) seeds of improved variety,
(ii) soil ameliorants,
(iii) plant nutrients,
(iv) farm machines/implements, and
(v) plant protection measures

In addition, a special initiative under the name of the ***Accelerated Pulses Production Programme*** was initiated in 2010 to boost the production of pulses by active promotion of technologies in 1,000 clusters of 1,000 ha (hectare) each.

Considerable achievements under the NFSM have been recorded during the course of implementation of the programme such as new farm practices, distribution of seeds of high yielding varieties of rice, wheat, pulses, and hybrid rice, and treating area with soil ameliorants to restore soil fertility for higher productivity. Through targeted interventions, the mission has already achieved, a year in advance, 25 millions tonnes of additional production of foodgrains exceeding the target of 20 million tonnes of production set for the terminal year 2011–12, of the Eleventh Plan.

MACRO MANAGEMENT OF AGRICULTURE (MMA)

The MMA was revised in 2008 to improve its efficacy in supplementing/complementing the **efforts of the states** towards enhancement of agricultural production and productivity.[39] It also provides opportunity to draw upon agricultural development programmes out of ten sub-schemes relating to crop production and natural resource management, and give it the flexibility to use 20 per cent of resources for innovative components.

The revised MMA scheme has formula-based allocation criteria and provides assistance in the form of grants: loan to the states/UTs on 90:10 ratio basis, except in case of the north-eastern states where the central share is 100 per cent grant.

RASHTRIYA KRISHI VIKAS YOJANA (RKVY)

The RKVY was launched in 2007–08 for incentivising states to enhance public investment to achieve 4 per cent growth rate in agriculture and allied sectors during the Eleventh Plan.[40] The RKVY format permits taking up national priorities as sub-schemes, allowing the states flexibility in project selection and implementation. The sub-schemes include—

(i) Bringing Green Revolution to eastern region;
(ii) Integrated development of 60,000 pulses villages in rainfed areas;
(iii) Promotion of oil palm;
(iv) Initiative on vegetable clusters;
(v) Nutri-cereals;
(vi) National Mission for Protein Supplements;

38. ***Economic Survey 2011-12,*** op. cit., p. 190.
39. ***Economic Survey 2011-12,*** op. cit., p. 190.
40. ***Economic Survey 2011-12,*** op. cit., p. 190.

(vii) Accelerated Fodder Development Programme;

(viii) Rainfed Area Development Programme; and

(ix) Saffron Mission.

The RKVY links 50 per cent of central assistance to those states that have stepped up percentage of state plan expenditure on agriculture and allied sectors. States have indeed increased allocation to agriculture and allied sectors from 4.88 per cent of total state plan expenditure in 2006–07 to 6.04 per cent of in 2010–11 *(*as per the Revised Estimates, *Economic Survey 2011–12).*

ISOPOM

The centrally sponsored ISOPOM (Integrated Scheme of Oilseeds, Pulses, Oil Palm, and Maize)[41] have been under implementation during the Eleventh Plan in 14 states for oilseeds and pulses, 15 for maize, and 9 for oil palm. The pulses component has been merged with the NFSM with effect from April 1, 2010. Oilseeds are raised mostly under rainfed conditions and are important for the livelihood of small and marginal farmers in the arid and semi-arid areas of the country.

NATIONAL HORTICULTURE MISSION(NHM)

The horticulture sector includes a wide range of crops, such as fruits, vegetables, roots and tuber crops, flowers, aromatic and medicinal plants, spices, and plantation crops, which facilitate diversification in agriculture. It has been recognised that growing horticulture crops is now an ideal option to improve livelihood security, enhance employment generation, attain food and nutritional security, and increase income through value addition. Over the years, there have been noticeable achievements and significant improvement in the production and productivity of various horticulture crops.

The NHM scheme was launched[42] during the Tenth Plan for **holistic development** of the horticulture sector, duly ensuring *forward* and *backward linkages* by adopting a *cluster approach,* with the active participation of all stakeholders. The supply of quality planting material through establishment of nurseries and tissue culture units, production and productivity improvement programmes through area expansion and rejuvenation, technology promotion, technology dissemination, human resource development, creation of infrastructure for post-harvest management and marketing in consonance with the comparative advantages of each state/region and their diverse agro-climatic conditions are the major programmes of the Mission. A major initiative has been taken during 2011–12 for enhancing the supply of good quality vegetables to metro cities under the *Vegetable Initiative in Urban Clusters (VIUC).*

NATIONAL BAMBOO MISSION (NBM)

The NBM, a centrally sponsored scheme of the Ministry of Agriculture for harnessing the potential of the bamboo crop in the country, is under implementation in 27 states. It envisages promoting *holistic growth of the bamboo sector* by adopting an area-based, regionally differentiated strategy to increase the area under bamboo cultivation and marketing.[43] Under the Mission, steps have been taken to increase the availability of quality planting material by supporting the setting up of new nurseries/tissue culture units and strengthening existing ones. To address forward integration, the Mission is taking steps

41. ***Economic Survey 2011-12,*** op. cit., p. 190-191.
42. ***Economic Survey 2011-12,*** op. cit., p. 191-192.
43. ***Economic Survey 2011-12,*** op. cit., p. 192.

to strengthen marketing of bamboo products, especially those related to handicraft items. Besides the Mission has provided financial assistance to different institutions/universities for twenty-three R&D projects aimed at higher productivity of bamboo. Agro-forestry trials comprising bamboo grown along with agricultural/horticultural crops and medicinal plants under different agro-climatic conditions in various states have been initiated.

NATIONAL AGRICULTURAL POLICY, 2000[44]

The Union Government has announced the new National Agricultural Policy in the Parliament on July 28, 2000. This policy has been planned under the provisions of the ***World Trade Organization*** so as to face the challenges of the agriculture sector. This policy gives emphasis on promoting agricultural exports after fulfilling domestic demand. The salient features[45] of this policy are:

(i) 4 per cent growth rate p.a. for the next two decades.

(ii) 4 per cent growth rate p.a. target to be achieved by 2005.

(iii) Land reforms to provide land to poor farmers.

(iv) Consolidation of holding in all states of the nation.

(v) Promoting private investments in agriculture.

(vi) Provide insurance umberalla for crops to farmers.

(vii) Promote bio-technology.

(viii) Promoting research for developing new varieties of crops and ensuring protection to the developed varieties.

AGRICULTURAL INSURANCE

There are various major crop insurance schemes under implementation in the country:

(i) *National Agricultural Insurance Scheme (NAIS):* The NAIS is a government-sponsored central-sector crop insurance scheme being implemented in the country since 1999–2000 season (the erstwhile *Comprehensive Crop Insurance Scheme-CCIS* of 1985 was merged into it) with the **objective** of providing financial support to farmers in the event of failure of crops as a result of *natural calamities, pests and diseases.* The Agriculture Insurance Company of India Ltd. (AICIL) is the implementing agency for the scheme. At present, the scheme is being implemented by 25 states and two UTs.[46]

(ii) *Modified NAIS (MNAIS):* With the aim of further improving crop insurance schemes, the MNAIS is under implementation on **pilot basis** in 50 districts in the country from rabi 2010–11 season. Some of the major improvements made in the MNAIS are[47]—

(a) *Actuarial premium* with *subsidy in premium* at different rates;

(b) All claims liability to be on the insurer;

44. ***Economic Survey 2000–01,*** MoF, GoI, N. Delhi.

45. New Agriculture Policy has been described as "Rainbow Revolution" which includes the following revolutions:
Green (Food Grain Production), White (Milk), Yellow (Oil seeds), Blue (Fisheries), Red (Meat/Tomato), Golden (Fruits-Apple), Grey (Fertiliser), Black/Brown (Non-conventional Energy Sources), Silver (Eggs) and Round (Potato).
The above Rainbow Revolution also includes "Food Chain Revolution" to put a check on destroying foodgrains, vegetables and fruits.

46. ***Economic Survey 2011–12***, MoF, GoI, N. Delhi.

47. ***Economic Survey 2011–12,*** MoF, GoI, N. Delhi.

(c) Unit area of insurance reduced to village panchayat level for major crops;

(d) Indemnity for prevented/sowing/planting risk and for post-harvest losses due to cyclone;

(e) On account payment up to 25 per cent advance of likely claims as immediate relief;

(f) More proficient basis for calculation of threshold yield; and

(g) Allowing private sector insurers with adequate infrastructure.

Only upfront premium subsidy is shared by the central and state governments on 50:50 basis and claims are the liability of the insurance companies. The scheme has been notified by 17 states by now.

(iii) *Pilot Weather Based Crop Insurance Scheme (WBCIS):* Being implemented as a central-sector scheme from kharif 2007 season. The scheme[48] is intended to provide protection to farmers *against adverse weather incidence,* such as deficit and excess rainfall, high or low temperature, and humidity that are deemed to adversely impact crop production. This is based on actuarial rates of premium, but to make the scheme attractive, premium actually charged from farmers has been restricted to be at par with the NAIS.

(iv) *Krishi Shramik Suraksha Yojana:* The multi-benefit scheme[49] for the agricultural workers, commenced on July 1, 2001, provides life insurance protection, lump sum survival benefit and pension to those who are between the age of 18–50 years—functions on group-basis with minimum of 20 members. No new lives are added even under existing schemes at the time of renewal. Gram Panchayat acts as the nodal agency and with the help of NGO/SHG or any other agency which identify the agricultural workers.

(v) *Farm Income Insurance Scheme:* The scheme[50] commenced in January 2004 for providing insurance safeguards and economic security to farmers—run by the Ministry of Agriculture and Indian Agriculture Insurance Company Ltd. jointly:

(a) Provides ***'broader risk insurance'***

(b) Conceived to provide income protection to the farmers by integrating the mechanism of *insuring production* as well as *market risks*

(c) Farmer's income is protected by ensuring minimum guaranteed income.

(d) Subsidy in premium payment

(e) Available for all the states and compulsory for farmers availing crop loans.

NAIS will be withdrawn for the crops covered under it, but would continue to be applicable for other crops.

(vi) *Varsha Bima (Rainfall Insurance Scheme):* Introduced in 2004 south-west monsoon period—***covers*** all natural rainfal risks and provides[51] five different options suiting varied requirements of the farming community:

48. ***Economic Survey 2006–07,*** op. cit.
49. ***India 2010 & 2011,*** Pub. Division, N Delhi, P. 379.
50. ***Economic Survey 2004–05,*** MoF, GoI, N. Delhi.
51. ***India 2005,*** GoI, N. Delhi.

(a) Seasonal rainfall insurance based on aggregated rainfall from June to September

(b) Sowing failure insurance based on rainfall between June 15 and August 15

(c) Rainfall distribution insurance with the weightage assigned to different weeks between June and September

(d) Agronomic Index constructed on the basis of water requirements of crops

(e) A catastrophe option covering extremely adverse deviation of 50 per cent and above in rainfall during the season

This scheme ***covers*** all natural rainfall risks at the following stages:

(a) Failure of seed crop either in full or in parts due to natural risks

(b) Loss in expected raw seed yield

(c) Loss of seed crop after harvest

(d) At seed certification stage

RESEARCH AND EXTENSION

The Indian Council of Agricultural Research (ICAR) is engaged in developing new crop varieties with specific traits that improve yield and nutritional quality along with tolerance /resistance to various biotic and abiotic stresses. Besides, it matches crop production and protection technologies to target agro-ecologies. The adoption of improved varieties and crop management technologies has resulted in enhancement of production and productivity of cereals, pulses, and other field crops. The *Economic Survey 2014–15* outlines the issues and challenges in this regard in the following way:

(a) It is imperative to make Indian agricultural growth science-led by shedding 'technology fatigue'. There is a need of creating research institutions on the pattern of Indian Institutes of Technology (IIT) and Indian Institutes of Sciences (IIS). In 2015–16, the GoI aims to set up two institutes of excellence in Assam and Jharkhand to promote the cause.

(b) Greater investment in applied research, education, and extension will serve multiple aims in the sector—enhanced growth, cost cutting, increase in yield and productivity together with equipping the country for the Second Green Revolution.

(c) The latest NSSO Survey (70th Round, December 2013) indicates that about 59 per cent of farmers do not get much technical assistance and know-how from government-funded farm research institutes or extension services. So they have to rely on progressive farmers, media, and private commercial agents such as dealers of farm inputs like seeds, fertilizers, and pesticides for technical information.

(d) To ensure last-mile connectivity, extension services need to be geared up to address emerging technological and information needs. Effectiveness of the 'lab-to-farm' programme can be improved by leveraging information technology and **e-** (net-based) and **m-** (mobile-based) applications, participation of professional NGOs, etc.

The government took initiative in 2015 to set up the *Kisan TV* for disseminating realtime information to farmers regarding new farming techniques, water conservation, organic farming, etc., will partly make up for the existing adverse ratio of one extension worker for every 800 to 1,000 farmers and provide farmers a direct interface with agricultural experts.

Some of the *major existing schemes*[52] in this regard as given below:

(i) ***Mass media support*** to agriculture focusing on Doordarshan infrastructure and All India Radio (AIR) broadcasting agriculture-related information;

(ii) ***Kisan Call Centres*** (KCC) to provide agricultural information to the farming community through toll-free telephone lines;

(iii) ***Agri-clinic*** and ***agri-business*** centres by agriculture graduates to provide extension services to farmers on payment basis through setting up of economically viable self-employment ventures, and information dissemination through agri-fairs;

(iv) ***Extension education institutes*** at Nilokher (Haryana), Rajendra Nagar (Andhra Pradesh), Anand (Gujarat), and Jorhat (Assam) are operating at regional level to improve the skills and professional competence of extension field functionaries of agriculture and allied departments;

(v) There are ***model training courses*** on thrust areas of agriculture, horticulture, animal husbandry, and fisheries with the objective of improving the professional competence, upgrading the knowledge, and developing technical skills of subject matter specialists/extension workers of agriculture and allied departments; and

(vi) ***MANAGE,*** Hyderabad, an apex institute at the national level, provides training to middle and senior level officers of agriculture and allied departments of the states/UTs.[53]

(vii) The Support to State Extension Programme (SSEP) is being launched by the GoI since 2005–06 with the objective of making the extension system farmer-driven as well as accountable to farmers. For this, **ATMAs** (Agricultural Technology Management Agencies) has been set up at district level, which have active particiaption of farmers, farmers groups, NGOs and other stakeholders.

FARM MECHANIZATION

Agricultural mechanization is one of the main drivers of agricultural sector growth. Farm power availability and average foodgrain yield have a direct relationship. It increases productivity of land and labour by meeting timeliness of farm operations and increases work output per unit time. Besides its paramount contribution to the multiple cropping and diversification of agriculture, mechanisation also enables efficient utilisation of inputs such as seeds, fertilizers, and irrigation water. Following ***observations*** are quite relevant in this regard:

52. Several volumes of **Economic Survey** and **India** upto 2015-16.

53. ***MANAGE*** was established in 1987, as the *National Centre for Management of Agricultural Extension* at Hyderabad, by the Ministry of Agriculture, Government of India as an autonomous Institute, from which its acronym *'MANAGE'* is derived. In recognition of its importance and expansion of activities all over the country, its status was elevated to that of a National Institute in 1992 and re-christened to its present name i.e., National Institute of Agricultural Extension Management.

    MANAGE is the Indian response to challenges of agricultural extension in a rapidly growing and diverse agriculture sector. The policies of liberalization and globalization of the economy and the level of agricultural technology becoming more sophisticated and complex, called for major initiatives towards reorientation and modernisation of the agricultural extension system. Effective ways of managing the extension system needed to be evolved and extension organisations enabled to transform the existing set up through professional guidance and training of critical manpower. MANAGE is the response to this imperative need.

(i) Although India is one of the top countries in agricultural production, the current level of farm mechanisation, which varies across states, averages around 40 per cent as against more than 90 per cent in developed countries *(Economic Survey 2014–15)*.

(ii) The farm mechanisation in India has been growing at a rate of less than 5 per cent in last two decades*(Economic Survey 2014–15)*.

(iii) The economic benefit of adoption of improved implements is about Rs. 80,000 crore per annum, which is only a small fraction of the potential *(ICAR, 2015)*.

(iv) Farm mechnaisation has resulted in generating employment to rural youth and artisans for the production, operation, and maintenance of machines *(Economic Survey 2013–14)*.

(v) Due to significant and continuous reduction of agricultural workforce, higher levels of farm mechanisation are necessary for sustaining productivity and profitability *(Economic Survey 2013–14)*.

India faces mainly ***two main challenges*** in its drive towards farm mechanisation:

(i) Highly diverse agriculture with different soil and climatic zones, requiring customized farm machinery and equipment, and

(ii) Small land holdings with limited resources.

In the 12th Plan the GoI launched a dedicated *Sub-Mission on Agricultural Mechanisation* with focus on spreading farm mechanisation to small and marginal farmers and regions that have low farm power availability.

NATIONAL MISSION FOR SUSTAINABLE AGRICULTURE (NMSA)

The NMSA, launched in 2011–12, **aims** at enhancing food security and protection of resources such as land, water, biodiversity and genetic resources by developing strategies to make Indian agriculture more resilient to climate change.[54] The ***Economic Survey 2011–12*** discusses the *Impacts of Climate Change on Indian Agriculture* in the following points:

(i) Indian agriculture, with two-third rainfed area remains vulnerable to various vagaries of monsoon, besides facing occurrence of drought and flood in many parts of the country. Natural calamities such as drought and flood occur frequently in many parts of the country.

(ii) Climate change will aggravate these risks and may considerably affect food security through direct and indirect effects on crops, soils, livestock, fisheries and pests. Building climate resilience, therefore, is critical.

(a) Potential adaptation **strategies** to deal with the adverse impacts of climate change are :

(b) Developing cultivars tolerant to heat, moisture and salinity stresses;

(c) Modifying crop management practices; improving water management;

(d) Adopting new farm practices such as resource-conserving technologies;

(e) Crop diversification; improving pest management;

(f) Making available timely weather-based advisories;

54. ***Prime Minister's Council on Climate Change (PMCCC)*** approved the Mission in September 2010 and the Ministry of Agriculture initiated activities under the Mission in 2011-12.

(g) Crop insurance; and harnessing the indigenous technical knowledge of farmers.

The Indian Council of Agricultural Research has initiated a scheme on *National Initiative on Climate Resilient Agriculture (NICRA).* The initiative has been planned as a multi-disciplinary, multi-institutional effort covering crops, livestock and fisheries, and focusing mainly on adaptation and mitigation of climate change in agriculture. It also has a component for demonstration of climate-coping technologies on farmers' fields in 100 most vulnerable districts. State-of-the-art infrastructure is being set up at key research institutes to undertake frontier research on climate change adaptation and mitigation.

SECOND GREEN REVOUTION

Use of all eco-friendly means in cultivation is the Second Green Revolution (SGR) or Evergreen Revoultion or Sustainable Agriculture. For experts[55] it includes the agricultural practices such as,

(i) replacing chemical fertilisers by bio-fertilizers;

(ii) in place of chemical pesticides using bio-pesticides;

(iii) conserving water, balanced cropping pattern, proper crop combinations, etc;

Such agricultural practices are popular in developed economies as *organic farming.*[56]

SECOND GREEN REVOLUTION IN INDIA

The Second Green Revolution in India is *a concept* as well as the name of *a programme.* It was suggested as an idea of sustainable agriculture in mid-1990s by agro-scientists as the ongoing GR was not based on sustainable agricultural practices. When the Indian President, Dr. Kalam suggested for the same, he attached much wider meaning to it. For him it consisted of, crop management, cost reduction, value addition, processing and marketing other than the green farming.

In January 2004, the Government of India announced a major agricultural programme named as the Second Green Revolution with an initial fund allocation of Rs. 50,000 crore. This programme was so exhaustive that it had hardly left any problem area of Indian agriculture untouched and had every potential of solving all long-standing problems. In a sense it was a complete agricultural policy based on the concept of sustainable development and well-equipped to fight the challenges posed by the WTO and capable enough to make Indian agriculture to emerge as a winner in the globalising economy. As there was a government change at the Centre, the complete details of the programme were not made available. The present government at the Centre has not been referring to this programme, but in practice it looks like promoting the same causes more vigorously. In the meantime, the President has been quoting the need for a second green revolution time and again.

SUMMING UP THE SECOND GREEN REVOLUTION

If we add up the ***different announcements*** by the governments time to time and the ***propositions of experts*** we may sum up the idea of the second green revolution in India with the help of its three broad coordinates:

(i) *Increasing Agricultural Production:* It includes four major things—

55. As per M.S. Swaminathan, Dr. A.P.S. Abdul Klam, P.S. Paroda, ICAR, etc.

56. This kind of farming had already commenced in the Euro-American economies by the 1980s. However, the concept gained popularity by the early 1970s in the wake of environmental pollution due to rapid industrialisation. ***The Brundtland Report on Sustainable Development*** (1987) gave the ultimate boost.

(a) Unlike the Green Revolution which was limited to only five foodgrains (wheat, rice, jowar, bajra, maize), the Second Green Revolution includes all agricultural products—cereals, cash crops, animal husbandry (dairy, goatry, piggery, poultry, etc.), fisheries, sericulture, etc. It is rightly called the ***Rainbow Revolution***, Naturally, it is the most ambitious idea in the agriculture sector of India ever formalised.

(b) It deals with suitable kinds of cropping pattern, crop diversification, crop management, plant protection, checking per-harvest losses of agricultureal products, as well as post-harvest, integrated pest management, soil conservation, etc.

(c) Initiation of sustainable practices in agriculture are all instrumental factors of sustainable agriculture to be utilised.

(d) One very important point should be noted here that India cannot afford to go for only green farming or organic farming in the name of sustainable agricultural development. As the replacement of chemical inputs by the organic ones has every chance of reducing production and with use of costlier inputs, the produce of such a farming will not be economically accessible by the vast poor population of India (already due to costlier outputs, of the GR masses lack the required purchasing capacity). That is why ***'cost cut'*** is an integral part of this revolution. And that is why agro-scientists have suggested to base our agriculture on ***biotechnology***. Use of biotechnology in agriculture does not only open new dimensions for it but it has every potential to cut costs of the agricultural products by doing miraculous and unthinkable kind of research and development. India is very much aware of this reality that without an active support of biotechnology, sustainable agricultural development will have only elitist value and nothing else.[57]

(ii) *Value Addition:* Indian agriculture has been lacking the aspect of value addition. In the Indian agriculture sector right from farmers to the traders there has been a tendency of deposing agricultural goods in its primary form. That is why the real potential of Indian agriculture to create gainful employment has never been tapped. This green revolution tries to go for it in a big way. In this direction there will be an increased emphasis upon agro-processing, beverages and drinks industries.

(iii) *Strengthening the Infrastructural/ Institutional Aspects:* The last coordinate

57. Some of the known potential which the agro-scientists are in the process of speedier implementation are—7 to 8 times potential of increasing productivity of the foodgrains; drought and flood resistant seed development; pest-resistant seeds; hybrid seeds like ***'pomato'***; new bio-fertilisers and bio-pesticides; etc., All these new technologies initiated into the agricultural practices will not only boost the production but cut the costs enabling India to have ***economic reach*** to food being with the eco-friendly methods of farming.

As the question of ***food security*** is a matter of immediate concern for countries like India and China, the onus of popularising the genetically modified foods (GMFs) remains on them. That is why we see these two countries allowing the use of the GMFs in recent years.

of the Second Green Revolution is related to the aspects of timely and adequate infrastructural/institutional support without which it cannot happen:

(a) We need to strenghen the ***credit delivery*** aspects for the agriculture sector—both at the micro and macro levels (for corporate farming).

(b) The ***storage facilities*** for agricultural products in India is among the weakest in the world. India does not have adequate capacity of dry godowns and cold storage. In the area of refrigerated storage, much needs to be done. A beginning has been made recently by the railways with the initiation of the refrigerated station wagons. Basically, private sector participation is considered very vital for the growth of this segment.

(c) The country lacks a suitable kind of ***transport connectivity*** for which super-highways and rural connectivity programmes are today the high priority areas for the government. The private sector is also being encouraged though at present it too seems to have a limited role in this area, especially in urban areas and at the micro level only.

(d) The development of ***telecommunication*** with all modern means are necessary pre-conditions for the timely development of the agriculture sector and for the empowerment of the farmer.

(e) The ***irrigation preparedness*** of India needs grassroots level approach (already part of the Bharat Nirman) and needs a foolproof systemic approach. It becomes specially important once the climate has started showing its vagaries more and more in recent times.

(f) Everything done till date in the area of developing, an adequate kind of ***marketing network*** for agricultural products has not been capable of delivering the same. And that is why the profession of agriculture has been failing to emerge as an economic and profitable area for the farmers. We need to restructure and strengthen it right from the grassroots level to the national level. Only then can we internationalise (***globalise***) our agriculture sector.

(g) If there has been any one area which has failed to have the proper care and support of insurance it has been the agriculture sector. Even after covering all agricultural activities and products under the agricultural insurance scheme (The National Agricultural Insurance Scheme, 1999) it has very low penetration basically due to lack of awareness among the farmers/ beneficiaries. Now the government is trying hard to do the same which also depends upon suitable level of insurance sector reforms, state governments, care to the sector and awareness among the beneficiaries. At present India has insurance coverage for the crops, seeds. Now there is a proposal to cover even the marketing risk, too.

If we make some **statements** about the SGR, there must not seem any exaggeration in it:

(i) "The SGR is capable of solving the whole gamut of problems related to Indian food philosophy."

(ii) "The SGR will give agriculture & rural development the due it deserves."

(iii) "The SGR will make Indian agriculture face the challenges of the WTO and emerge as a net gainer in the process of globalisation."

(iv) "The SGR is the best route to make economic reforms reach the masses and benefit those who consider it anti-poor, anti-agriculture and anti-rural areas."

(v) "The SGR is the best way to let people feel that economic reform has a *human face* and very much essential for rich and poor, alike."

(vi) "The SGR is, undoubtedly the best and the ultimate as well as a complete agriculture policy of India."

In recent times, the governmental approach has gone for a complete change in favour of the agriculture sector and the SGR. It is clearly visible from the streamlining of the New Agricultural Policy (2000), the Union Budget, Foreign Trade Policy, the Credit and Monetary Policy what would be the future requirements of the SGR.

IMPACT OF SECOND GREEN REVOLUTION

The Second Green Revolution has every prospect of revolutionising the agriculture sector of India with multi-dimensional positive impact on agriculture in particular and the economy, in general:

(i) As agricultural production will increase, India will be safe from ***food security*** concern. This will provide India ***physical access*** to food.

(ii) Every Indian will have ***economic access*** to food because of increase in production and cost cut due to genetically modified foods (GMFs) will make food cheaper.

(iii) As this is a sustainable kind of agriculture revolution, India will also be able to make its agriculture sector ecologically safe—the achievement of ***ecological access*** will become possible.

(iv) The surplus agricultural produce will enter the world market and agriculture sector will be able to tap the ***benefits of globalisation*** thus, farmers, rural areas and agri-business will be able to feel the benefits of economic reforms and globalisation.

(v) It will create ***gainful employment*** sources in the agriculture sector on which more than 58 per cent of the population depends for its livelihood. It will serve the purposes of poverty alleviation, bridging economic inequality, boosting rural development, solving the curse of unemployment, etc.

(vi) It will eliminate hunger and malnutrition from India.

(vii) India won't be an example of '***market failure***'—its market will succeed by increasing the purchasing capacity of the population.

(viii) Living standard of the population will improve and development has to show up. Thus, India's rank on the human development index (HDI) will improve for sure.

Other than the above-given points, there will be numerous related positive effects on the economy as a whole and on the agriculture sector in particular.

Second Green Revolution Strategy was adopted in the Eleventh Plan.[58] The urgent need for taking agriculture to a higher trajectory of four per cent annual growth can be met only with improvement in the scale as well as quality of agricultural reforms undertaken by the various

58. ***Economic Survey 2006–07,*** op. cit.

states and agencies at various levels. These reforms must aim at efficient use of resources and conservation of soil, water and ecology on a sustainable basis, and in a holistic framework. Such a holistic framework must incorporate financing of rural infrastructure such as water, roads and power.

The approach paper to the Eleventh Five Year Plan has highlighted such a holistic framework and suggested the following strategies to raise agricultural output:

(i) Doubling the rate of growth of irrigated area;

(ii) Improving water management, rain water harvesting and watershed development;

(iii) Reclaiming degraded land and focusing on soil quality;

(iv) Bridging the knowledge gap through effective extension;

(v) Diversifying into high value outputs, fruits, vegetables, flowers, herbs and spices, medicinal plants, bamboo, bio-diesel, but with adequate measures to ensure food security;

(vi) Promoting animal husbandry and fishery;

(vii) Providing easy access to credit at affordable rates;

(viii) Improving the incentive structure and functioning of markets; and

(ix) Refocusing on land reforms issues.

The National Commission on Farmers has already laid the foundation for such a framework.[59] Programme formulation as well as their implementation in the states must be based on unique regional contexts incorporating agro-climatic conditions; and availability of appropriate research and development (R&D) backed by timely and adequate extension and finance.

SECOND PUSH TO AGRICULTURE

The post-Green Revolution programme launched by the Government of Punjab in 2004, includes introduction of new technology in agriculture (green farming techniques, use of biotechnology, etc., encompassing the idea of *sustainable development*) besides crop diversification, promotion dairy and bee-keeping, floriculture, horticulture, modernising agriculture markets and value addition.[60]

WTO AND THE INDIAN AGRICULTURE: PROSPECTS AND CHALLENGES

With the operationalisation of the provisions of the World Trade Organization (WTO), the process of globalisation commenced in the major parts of the world—the non-member countries, in the coming few years, also started negotiating for entry into the club. There has always been an air of confusion among the members and the non-members of the WTO in assessing the pros and cons of globalisation on the health of their economies. The sector which has created the highest number of deliberations in the WTO as well as views and counterviews has been agriculture—an area of utmost concern for the developed and the developing worlds alike. India is no exception to it, better say it has been among the few countries in the world spear-heading the campaign against the biased provisions of the WTO concerning agriculture.

India was skeptical about the issue even before joining the organisation, but once it became a part of it, it started assessing the situation objectively and moved towards crisis mitigation. Globalisation as such opened unlimited prospects for the economies, but at the same time brought several challenges too. Yes, the challenges were different

59. ***India 2007,*** (op. cit.) might be seen for details.

60. Ministry of Agriculture, Government of Punjab, June 2004, Chandigadh.

in nature for the developed and the developing countries. We need to enquire the prospects and the challenges brought by the WTO for Indian agriculture.

Had the agriculture of the leading and politically vocal developing economies not be of subsistence level, the course of the world would have been completely different. It is the biggest hurdle in the process of globalisation and the success of the World Trade Organization. Yes, the process of converting the sector into an industry has already started in most of the leading developing economies amidst tough resistance from the farmers, political parties and the NGOs alike.

THE PROSPECTS

The oldest and the first document regarding the impact of the implementation of the provisions of the WTO, Uruguay Round (1995–2005) was prepared jointly by the World Bank, the GATT[61] and the OECD[62]. According to the joint document, the WTO provisions were supposed to have the following positive impacts on the world trade:

(i) By 2005 there will be an addition of $745 billion in the world merchandise trade.[63]

(ii) The ***GATT Secretariat*** provided a full break-up of the above-projected trade increase in the following way:

(a) The clothing sector to have a share of 60 per cent.

(b) The agricultural, forestry and fisheries products to have a share of 20 per cent.

(c) The processed food, beverages and drinks to have a share of 19 per cent.

It means that due to the implementation of the WTO provisions, there will be only ***one per cent*** increase in the trade of all other goods excluding the above-cited sectors. It was a highly inflated view and became a matter of debate around the world. But the areas which were projected to have very high increase in their trade were not mere projections either. Member countries went home and started going for their own studies, estimations and projections—India being no exception. We must see the assessment of India:

(i) The products which were projected to have the maximum increase in their trade, India had a traditional great export potential in them. It means the WTO has a great prospect for agriculture in store as maximum goods fell in the agriculture sector. Assuming that India's share in the world exports improves from 0.5 per cent to 1.0 per cent, and India is able to take advantage of the opportunities that are created, the trade gains may conservatively be placed at $2.7 billion extra exports per year. A more generous estimate will range from $3.5 to $7 billion worth extra exports.[64]

(ii) The NCAER (National Council for Applied Economic Research) survey of

61. General Agreement on Trade and Tariff (GATT) was a multi-lateral arrangement (not an ***organisation*** like WTO whose deliberations are binding on the member countries) promoting multi-lateral world trade. Now the GATT has been replaced by the WTO (***since Jan. 1995***).

62. ***Organisation for Economic Cooperation and Development*** (OECD) was set up as a world body of the developed economies from the Euro-American region which today includes countries from Asia, too (such as Japan, S. Korea). The first idea of 'globalisation' was proposed by the OECD in the early 1980s at one of its Annual Meet (***at Brussels***).

63. Merchandise trade does not include services.

64. Economic Survey 1994–95, MoF, GoI, N. Delhi.

the WTO on the Indian economy is cited as the best document in this area. The survey[65] had all important things to say on this issue:

(a) The exports of agricultural products will be boosted by the WTO accepted regime.

(b) Only the foodgrains trade that too of wheat and rice were projected to be around $270 billion.

(c) The survey also pointed out that almsot 80–90 per cent of the increased supply of foodgrains to the world is going to originate from only two countries China and India as they are having the scope for increasing production.

(d) But the survey painted a very wretched picture about the preparedness of Indian agriculture sector to exploit the opportunities. It concluded China to be far better than India is this matter.

(e) It suggested almost every form of preparedness for the agriculture sector (at a glance we may have been on the Second Green Revolution in India—basically the revolution is modelled on the findings and suggestions of the survey).

(f) Lastly, the survey ended at a high note of caution and concern that if India fails in its preparations to make agriculture come out as a winner in the WTO regime the economy will emerge as the biggest importer of agricultural products. At the same time the cheaper agri-imports might devastate Indian agricultural structure and the import-dependence may ruin the prospects of a better life for millions of poor Indians.

(g) Even if India does not want to tap the opportunities of the globalising world it has to gear up in the agriculture sector since the world market will hardly be able to fulfil the agri-goods demands of India by 2025. It means, it is only India which can meet its own agri-goods demand in the future.

There is no doubt that the WTO has brought problably ***the last opportunity*** to make our masses have better income and standard of living via better income coming from agriculture. But provided we go for the right kind of preparation at the right time. There are enough prospects, undoubtedly.

THE CHALLENGES[66]

If the WTO brings high prospects for Indian agriculture, it also brings in some hard-boiled challenges in front of it. These could be seen as individual challenges of the similar economies as well as joint challenges of such economies. The ***first*** category of challenges pertains to the area of relavent preparations, investment and restructuring of agriculture. And the ***second*** category of challenges are nothing less than a revision in the very agricultural provisions of the WTO itself (around which today revolves the success and faliure of the organisation itself). We may take a look at the challenges before the Indian agriculture:

65. ***NCAER Survey*** headed by its chairman Rakesh Mohan, GoI, 1994.

66. The challenges and their possible remedies discussed in this sub-topic are based on some of the finest and timely debates and articles which appeared in many renowned journals and newspapers between the period 1994–2007. For better understanding of the readers only the consensual as well as the less-complex parts have been provided here.

(i) *Self-sufficiency of Food:* Due to inflow of cheaper foodgrains from the world it would not remain economically viable in India to produce them and farmers might incline in favour of the profitable agri-products. This will make India heavily dependent upon the world market for its food supplies, marring its achievement of food self-sufficiency. This will have serious political and ethical outcomes for India.[67]

(ii) *Price Stability:* Dependence on the world market for the supply of agricultural products and specially for foodgrains will never be safe for India. As the international market for the products is highly speculative and full of variations (due to natural factors) the price stability will be always in danger—fluctuations hamper the producers and consumers of agri-goods in India. It would be very tough to fight *dumping* of surplus agri-goods from other countries.

(iii) *Cropping Pattern:* The cropping pattern of agriculture might take a very imbalanced shape, which will be highly detrimental to the ecology at large[68] as the farmers will always be in favour of going for the crops and commodities which have comparative price advantage.

(iv) *Weaker Sections:* The benefits of globalisation may not be neutral to areas, crops and the people. There will never prevail a certainty as to which area/region or crops or the people are going to benefit from globalisation in which year. At the same time globalisation is a process where profits can be made, but it is a market-based concept. Those who are unable to produce due to lack of capital, investment and entrepreneurship will have no gains from it. They will be net consumers or buyers. Since India has a vast population of the weaker sections (as other third world countries have) this population will neither be able to increase its income nor be able to purchase the agri-goods having no price stability.

It means that the weaker sections of India might miss this chance of growth and development. We need to make the benefits of globalisation reach these people, too. This could be done by a timely and society-orientied public policy which is a big challenge.[69]

(v) *WTO Commitments:* There are certain time-bound obligatory commitments of India towards the provisions of the WTO in the area of agriculture, which are highly detrimental to the people and

67. Almost 50 per cent of the Indian population spends 75 per cent of its total income on the purchase of foodgrains—this is why their standard of life and nutrition depends on the indigenously grown food in a great way. Once the self-sufficiency is lost their lives will depend upon the ***diplomatic uncertainties*** of its regular supply. It will have serious political outcomes for the political scenario of India. Similarly, irregular supply of the foodgrains will create a high ethical dilemma, too.

68. Farmers might go for highly repetitive kind of cropping pattern creating problems for soil fertility, water crisis, etc. This will have highly adverse effects on the agriculture insurance companies, too.

69. The primary examples of corporate and contract farming have given enough hints that economically weaker sections of society have meagre chances of benefitting from the globalisation of agriculture—with major profits going to the corporate houses. Naturally, the governments (centre and states) will need to come up with highly effective policies which could take care of the economic interests of the masses.

The policies may focus on areas such as ***healthcare, education, insurance, housing, social security,*** etc. Already the governments have started emphasising the delivery and performance of the ***social sector*** but in the future, more focused and accountable programmes in the sector will be required.

the economy. We may see this challenge from two angles—

(a) According to the agricultural provisions, the total subsidies forwarded by the government to the sector must not cross 10 per cent of the total agricultural outputs. At the same time, exemptions to farmers are to be withdrawn—hampering the public distribution system badly. India's subsidies are still far below this limit, but commitments pose a threat to the sovereign decision making.

(b) The subsidies (with different names) to agriculture, which are forwarded by the developed countries are highly detrimental to Indian agriculture and they are very high, too.[70]

None of the above-given challenges are easy to fight. These are not to be fought by India alone, but almost all developing countries are to face it. Once the WTO comes into operation, many experts from India and abroad have provided ways to fight these challenges, which may be summed up in the following way—

(i) To fight the challenges related to self-sufficiency in food, the price stability and the cropping pattern a judicious mix of suitable kind of agricultural and trade policies will be the need of the hour. To the extent agricultural policy is concerned, India has a limited level of freedom. But the WTO regime does not allow the member countries to impose higher tarrif or tarrif itself to ward off cheaper agri-goods from entering the economy—this is the main reason behind the above challenges. It means it is essential to modify, change or revise the provisions of the WTO.

Similarly, the issue of agricultural subsidies (*the Boxes*) need to be equitably defined so that they do not look biased. Here also the provisions of the WTO need revision.

To fight out this typical challenge, experts suggested that the ***WTO is not God-given***. Its provisions may go in for change if concerted efforts are made by the member countries in this direction. Like-minded nations who face the same kind of crises should come together and go for a joint effort, from inside the WTO, for the revisions or relaxations in its provisions. Morality related and ethical issues might be used as eye-openers and a handy tool to have the attention of the developed nations and the WTO alike.

Prima facie this suggestion looked as a preach easier said than done. Post-1995 saw a polarisation of like-minded countries inside the WTO that finally culminated into failure of the ***Seatle Round*** of the WTO deliberations. The most powerful country in the world failed to convene a meeting that too in its most distant region (the Alaska)—a moral triumph of the poor over the rich. This incidence while indicating a possible failure of the WTO itself, boosted the morale of the developing countries to go for stronger groupings and even sub-groupings under the WTO.

After the Doha Round the USA had hinted to forget multilateralism and indicated its intentions towards bilateralism. The European Union had the same intentions, but it did not show it as openly as the USA. The year 2002 came as a watershed period for the WTO when the EU in its new diplomatic move announced to hear the agriculture-related issues of the developing

70. Some of the developed economies are still forwarding subsidies to the agricultural areas to the tune of 180–220 per cent! Again, the justification for such high subsidies have been provided by defining agriculture subsidies according to their ease—highly blurring and confusing.

nations. The USA announced the intentions few days after the EU announcement—just few days before the ***Cancun Meet*** of the WTO. The Hongkong deliberation of the WTO, though it did not give anything concrete to the develolping world, provided enough hope, there is no doubt in it. The real picture emerges in the next meet for which the different pressure groups had serious deliberations on alternatives of bargaining power.

The second level suggestion to India was in the area of preparedness for the WTO regime. India was required to set new and internationally best standards in the area of production by boosting areas such as—research and development, biotechnology, information technology, health and phytosanitary matters. This will make Indian goods and services compete in the international market.[71]

WTO AND AGRICULTURAL SUBSIDIES[72]

AMS

The subsidies provided by the government to the agricultural sector (i.e., domestic support) is termed by the WTO as Aggregate Measure of Support (AMS).[73] It is calculated in terms of *product* and *input* subsidies. The WTO argues that the product subsidies like minimum support prices and input subsidies (non-product) like credit, fertilizers, irrigation and power will cut production cost of farming and will give undue advantage to such countries in their access to the world market—such subsidies are called to cause ***'distortions'*** to the world trade. Such subsidies are not permitted in one sense as they have a minimum permissible limit *de minimis* under the provisions which is 5 per cent and 10 per cent of their total agricultural output in the case of developed and developing countries, respectively.

THE BOXES

The agricultural subsidies, in the WTO terminology have in general been identified by 'boxes' which have been given the colours of the traffic lights—*green* (means permitted), *amber* (means slow down, i.e., to be reduced) and *red* (means forbidden).

In the agriculture sector, as usual, things are more complicated. The WTO provisions on agriculture has nothing like *red box* subsidies, although subsidies exceeding the reduction commitment levels is prohibited in the *'amber box'*. The *'blue box'* subsidies are tied to programmes that limit the level of production. There is also a provision of some exemptions for the developing countries sometimes called the 'S & D box'.[74]

We may see them individually though they are very much connected in their applied form. The objective meaning of each one of them becomes clear, once one has gone through all of them.

AMBER BOX

All subsidies which are supposed to distort production and trade fall into the amber box, i.e., all agricultural subsidies except those which fall into the blue and green boxes.[75] These include government policies of ***minimum support prices***

71. Because even the agriculture related provisions are modified the global market will always run after the agri-products which are the best—pricewise, qualitywise, etc.
72. A simplified and 'easy-to-understand' analysis done on the basis of the documents of the ***Information and Media Relations Division*** of the World Trade Organisation Secretariat, Geneva, Switzerland, October, 2007.
73. Defined in ***Article 1*** and ***Annexures 3 & 4,*** Agreement on Agriculture (AoA), WTO, 1994.
74. ***Article 6.2, AoA***, WTO, 1994.
75. ***Article 6, AoA***, WTO, 1994.

(as MSP in India) for agricultural products or any help directly related to production quantities (as power, fertilizers, pesticides, irrigation, etc).

Under the WTO provisions, these subsidies are subject to reduction commitment to their minimum level—to 5 per cent and 10 per cent for the developed and the developing countries, respectively, of their total value of agricultural outputs, per annum accordingly. It means, the subsidies ***directly related*** to production promotion above the allowed level (which fall in either the blue or green box) must be reduced by the countries to the prescribed levels.

In the current negotiations, various proposals deal with issues like deciding the amount by which such subsidies should be reduced further, and whether to set product-specific subsidies or to continue with the present practice of the *'aggregate'* method.

BLUE BOX

This is the *amber box with conditions*. The conditions are designed to reduce distortions. Any subsidy that would normally be in the amber box, is placed in the blue box if it requires farmers to go for a certain production level.[76] These subsidies are nothing but certain direct payments (i.e., direct set-aside payments) made to farmers by the government in the form of assistance programmes to encourage agriculture, rural development, etc.

At present there are no limits on spending on subsidies in the blue box. In the current negotiations, some countries want to keep blue box as is because they see it as a crucial means of moving away from distorting the amber box subsidies without causing too much hardship. Others want to set limits or reduction commitments on it while some advocate moving these subsidies into the amber box.

GREEN BOX

The agricultural subsidies which cause minimal or no distortions to trade are put under the green box.[77] They must not involve price support.

This box basically includes all forms of government expenses, which are not targeted at a particular product, and all direct income support programmes to farmers, which are not related to current levels of production or prices. This is a ***very wide box*** and includes all government subsidies like—public storage for food security, pest and disease control, research and extension, and some direct payments to farmers that do not stimulate production like restructuring of agriculture, environmental protection, regional development, crop and income insurance, etc.

The green box subsidies are allowed without limits provided they comply with the policy-specific criteria.[78] It means, this box is exempt from the calculation under subsidies under the WTO provisions because the subsidies under it are not meant to promote production thus do not distort trade. That is why this box is called *'production-neutral box'*. But the facts tell a different story.[79]

In the current negotiations, some countries argue that some of the subsidies forwarded under this box (by the developed economies) do seriously distort trade (opposed to the view of minimal

76. ***Article 6, Para 5*** AoA, WTO, 1994.
77. ***Annexure 2, AoA***, and ***Para 1*** AoA, WTO, 1994.
78. ***Annexure 2, AoA***, AoA, WTO, 1994.
79. Basically, a large part of this box is used by the farmers in the USA and the European Union as basic investments in agriculture. India as well as other like-minded countries have this view and want this box to be brought under the AMS i.e. under the reduction commitments. The USA at the Hongkong Ministerial meet (December 2005) announced to abolish such subsidies in the next 12 year commencing 2008. The EU also proposed to reduce its 'trade distorting subsidies' by 70 per cent. None of them used the name green box which shows some internal vagueness.

distortion as used by Annexure 2)— it is the view of the developing countries. These countries have raised their fingers on the direct payments[80] given by the developed countries to their farmers via programmes like income insurance and income-safety schemes,[81] environmental protection, [82] etc. Some other countries take the opposite view and argue that the current criteria are adequate, and advocate to make it more flexible (so that it could be increased) to take better care of non-trade concerns such as environmental protection and animal welfare.

S&D Box

Other than the above-discussed highly controversial boxes of agricultural subsidies, the WTO provisions have defined yet another box, i.e., the Social and Development Box (S & D Box) allows the developing countries for some subsidies to the agriculture sector under certain conditions. These conditions revolve around ***human development issues*** such as poverty, minimum social welfare, health support, etc., specially for the segment of population living below the poverty line. Developing countries can forward such subsidies to the extent of less than 5 per cent of their total agricultural output.[83]

Export Subsidies

For export subsidy the WTO has provisions in two categories:

(i) Reduction in the total budgetary support on export subsidies, and

(ii) Reduction in the total quantity of exports covered by the subsidy.

Higher reduction commitment for the developed countries and lower for the developing countries are the provisions. But the developed nations forward such an inflated support to their agricultural exports that even after the committed reductions it will be highly price distorting against the agri-exports of the developing countries. It is therefore opposed by the developing countries.

Sanitary and Phytosanitary Measures

The provisions of the WTO allow member countries to set their own health and safety standards provided they are justified on scientific grounds and do not result in arbitrary or unjustified barrier to trade. The provisions encourage use of international standards and also include certain special and differential treatment in favour of developing countries.[84]

Though this provision has realised the scope of unjustified kind of health and phytosanitory measures on the developing countries, the developed nations have been beautifully able to do so by validating their health and related rules on scientific grounds. Such instances have distorted trade in favour of these countries and the developing countries' agriculture has been the real loser. The developing countries accuse such measures as the non-tarrif barriers used by the developed nations to block goods from the developing nations.

NAMA

The Non-Agricultural Products Market Access (NAMA) is a part of the WTO provisions which deals with the idea of encouraging market reach

80. ***Para 5, Green Box, AoA,*** WTO, 1994.
81. ***Para 7, Green Box, AoA,*** WTO, 1994.
82. Para 8, **Green Box, *AoA,*** WTO, 1994.
83. ***Article 6.2, AoA,*** WTO, 1994.
84. ***Article 14, AoA,*** WTO, 1994.

to the non-agricultural goods of the member countries.[85] But the encouragement was objected/ opposed by the developing countries, especially pointing to the non-tariff barriers enforced by the developed countries. At the Doha Ministerial Conference (November 2001), ministers agreed to start negotiations to further liberalise trade of non-agricultural products. By early 2002, a Negotiating Group on NAMA was created. The members at the meet decided to go for tariff reductions on non-agricultural products adopting the **Swiss Formula.** The negotiations are still in the process—updated position may be seen in detail in Chapter 16.

One major concern that the members took note was of the small and vulnerable economies for whom a flexibility was committed while going for tariff reductions. For India, market access is not an issue of tariffs alone, but it means elimination of tariff peaks and tariff escalation in the markets of the developed countries. It will also end the abuse of anti-dumping laws and remove non-tariff barriers (NTBs) used to block goods from developing countries.

SWISS FORMULA

A variety of alternative methods are possible in the process of tariff reductions—some are more common than others. Some are based on *formulas.* But one thing should be kept in mind that whatever formula be agreed upon it does not have value unless it is properly implemented. Even after a formula or combination of formulas has been agreed upon, the final outcome of tariff reductions may depend on the bargaining capacity between countries.

The **Swiss Formula**[86] belongs to the classification of formulas known as having harmonising impact. Since such a formula prescribes a higher/steeper cut on higher tariffs and lower cuts on lower tariffs it is seen to harmonise the rates by bringing the final rates becoming closer and bridging the gap.

The formula was proposed by Switzerland in the Tokyo round negotiations of GATT (1973–79). But Switzerland opposes using this method in the current agriculture negotiations—it prefers the **Uruguay Round formula.**

The Uruguay Round (1986–94) negotiations in agriculture produced an agreement for developed countries to cut tariffs on agricultural products by an average of 36 per cent over six years (6 per cent per year) with a minimum tariff cut of 15 per cent on each product for the period. It was a version of *flat rate* method of tariff reductions.[87]

NATIONAL FOOD SECURITY ACT

The National Food Security Act was enacted by the Ministry of Consumer Affairs, Food and Public Distribution by end-December 2013. India's most ambitious and world's largest social welfare programme provides legal right to about 82 crore people for subsidised foodgrains—a historic initiative towards ensuring food and nutritional security. Major highlights of the programme are as given below:

(i) It will cover upto 75 per cent rural and 50 per cent urban population (around two thirds of the total popultion) with uniform entitlement of 5 kg foodgrains per month at highly subsidised prices

85. As per the provisions of the WTO ***fishes, fisheries products*** and ***forest products*** don't fall under agriculture and have been classified as the non-agricultural products.

86. ***"Formula Approaches to Tariff Negotiations"*** (Revised), WTO, Oct. 2007.

87. ***Uruguay Round of GATT,*** 1994.

of Rs. 3, Rs. 2 and Rs. 1 per kg for rice, wheat and coarse grains, respectively. The *poorest of poor* households continue to receive 35 kg foodgrains per household per month under the *Antyodaya Anna Yojna* at the same subsidised prices.

(ii) It provisions for special focus on nutritional support to women and children—*pregnant* women and *lactating* mothers, besides being entitled to nutritious meals as per the prescribed nutritional norms will also receive maternity benefit of at least of Rs. 6,000. *Children* in the age group of 6 months to 14 years will be entitled to take home ration or hot cooked food as per prescribed nutritional norms.

(iii) Eldest woman of eighteen years of age or above will be head of the household for issue of ration card, and if not available, the eldest male member is to be the head of the household.

(iv) For effective implementation, the Act also contains provisions for **reforms** in PDS through *doorstep delivery* of foodgrains, application of information and communication technology (ICT) including end-to-end computerisation, leveraging *'Aadhaar'* for identification of beneficiaries, diversification of commodities under TPDS, etc.

(v) The Act provisions state and district level **redressal mechanism** with designated officers. The states will be allowed to use the existing machinery for District Grievance Redressal Officer (DGRO), State Food Commission, if they so desire, to save expenditure on establishment of new redressal set up. It also provides for **penalty** on public servants or authority, if found guilty of failing to comply with the relief recommended by the DGRO.

(vi) Provisions have also been made for disclosure of records relating to PDS, **social audits** and setting up of Vigilance Committees in order to ensure transparency and accountability.

The work of identification of eligible households is left to the states/UTs, which may frame their own criteria or use Social Economic and Caste Census (SECC) data, if they so desire. The central government will provide funds to states/UTs in case of *short supply* of food grains from the central pool. In case of non-supply of food grains or meals to entitled persons, the concerned state/UT governments will be required to provide such food security allowance as may be prescribed by the central government to the beneficiaries. In order to address the concern of the states regarding additional financial burden, The central government will provide assistance to the states towards cost of intra-state transportation, handling of foodgrains and FPS dealers' margin, for which norms will be developed. This will ensure timely transportation and efficient handling of foodgrains.

While enacting the Act, the Ministry estimated an annual foodgrains requirement of 61.23 MT, which will accrue estimated food subsidy of Rs.1,24,724 crore. Meanwhile, a High Level Committee (headed by Shanta Kumar), by early 2015, suggested the GoI to revise the covergare population under the Act from 67 to 40 per cent. The recommendation was severely criticised by the experts and the political parties in the country. The government is yet to take the final call on the issue.

FOOD PROCESSING

Indian food processing industry (FPI)[88] has not grown with the pace which we see in the developed countries—there has been certain reasons for it:

88. The analyses are based on several volumes of **Economic Survey, India** and the relevant documents of the **Government of India** between the period 2005-15.

(a) India has a lower urban population (around 30 per cent of the population).

(b) Whatever urban population India has it does not have the *typical* urban food habits. As majority of it is second or third generation in the urban areas they still continue with the non-urban/rural food habits detrimental to the consumption of the agro-precessed items.

(c) In recent times, there has come enough awareness among the population across the country regarding the chemicals which are used in the agro-processing industries—creating a general tendency to avoid such food articles (much damage has been done to the industry by the 'fast foods', adulteration in food items such as sweets, milk, etc.).

(d) A wave across the world towards comsuming more 'which comes on plants' than 'what is produced in plants'. A similar wave of 'slow food' has gained popularity across Europe and other parts of the world originating from France.

Moreover, India's agro-processing policy today guided by the following **drivers**:

(i) As urban population rises and urban food habits evolve, there will be increased demand for processed foods as it happened across the urbanising developed world. The economy has already started having an informed and increased demand in such food items as 'dietary habits' are in the process of shift (NSSO, 2014).

(ii) External dimension to it was also accepted by the government by mid-1990s. As per a joint GATT-OECD study, processed food are supposed to account for around 19 per cent of the increased trade after the provisions of the WTO are implemented.

(iii) A very high percentage of food items which have short shelf life get wasted in India. It does not look good for a country which is crippled by the short-supply of food and high rate of hunger.

Importance: While increased productivity is an essential component of a vibrant agricultural sector, improved post-harvest handling and processing is essential to ensure value addition, reduction in wastage and to make good quality products reach the markets. Too often, even when the yields are high, producers lose income due to poor post-harvest practices.

Aim: Food processing aims to make food more *digestible, nutritious* and *extend the shelf life*. Due to the seasonal variations high levels of wastage or shortages can arise if adequate measures are not taken to preserve and store the food. Food processing covers all the processes that food items go through from the *farm to the consumers' plate*. It includes basic cleaning, grading and packaging as in case of fruits and vegetables and also alteration of the raw material to a stage just before the final preparation. Value addition processes to make 'ready-to eat' food like bakery products, instant foods, flavored and health drinks, etc., are also included in this *definition*.

Food processing *offers* an opportunity for the creation of sustainable livelihoods and economic development for the rural communities. Food processing has come a long way in the last few decades. The everchanging lifestyles, food habits and tastes of customers globally have altered the dynamics of the industry. Food processing benefits all the sections of the society:

(i) *Farmers* get better returns, higher yield, and lower the risks drastically;

(ii) *Consumers* get access to a greater variety, better prices and new products;

(iii) *Economy* gets benefit via creation of new business opportunities, while the workforce gets employment.

With a huge production base, India can easily become one of the leading food suppliers to the world while at the same time serving the vast growing domestic market of over a billion people. India's large market size with growing incomes and changing life styles also creates incredible market opportunities for food producers, food processors, machinery makers, food technologists and service providers in this sector.

Growth in the food processing sector is also expected to open up a lot of opportunities for players having strong linkages in the agri-value chain. Significant investment opportunities are yet to be tapped in the areas of *supply chain management, cold storages, financing, retailing* and *exports*.

Historically, agriculture and FPI have been plagued by factors such as:

(i) Low public investment,
(ii) Poor infrastructure,
(iii) Inadequate credit availability, and
(iv) High levels of fragmentation.

Rules & Regulations: Rules and regulations regarding the industry is as given below:

(a) Most food processing enterprises have been exempted from industrial licensing under the Industries (Development and Regulation) Act, 1951 with the exception of beer and alcoholic drinks, and items reserved for the small scale sector.
(b) For foreign investment, automatic approval is given even up to 100 per cent equity for a majority of processed foods.
(c) For manufacture of items reserved for MSEs, FDI is permissible under automatic route up to 24 per cent.

Attractive **packaging** makes the product more appealing to consumers who are therefore willing to pay more if the product offered is of good quality and easy to use. The policy initiatives of the government also include assistance for opening up of mega food park, cold chain and development of agri-export zones, skill development and R&D activities. Apart from the various schemes from the central government, various state governments are implementing their own food processing promotion policies and schemes.

Contributions: The sector contributes around 10 per cent of GDP in agriculture and manufacturing sector. During the last 5 years, FPI sector has been growing at an average annual growth rate (AAGR) of around 6 per cent as compared to around 4 per cent in agriculture and 7 per cent in manufacturing.

Infrastructure Development: The Ministry of Food Processing Industries (MoFPI) has been implementing a scheme for the creation of modern enabling infrastructure which includes mega food parks scheme, scheme for cold chain, value addition and preservation infrastructure and the scheme for construction and modernisation of abattoirs.

Mega Food Parks Scheme (MFPS): The Mega Food Parks Scheme *aims* to accelerate the growth of the food processing industry in the country by facilitating establishment of strong food processing infrastructure backed by an efficient supply chain. Under this scheme, capital grant of 50 per cent of the project cost is provided in general areas and 75 per cent in difficult and ITDP (Integrated Tribal Development Programme) notified areas (with a ceiling of Rs 50 crore). Each Mega Food Park takes about 30–36 months to be completed.

Cold Chain, Value Addition and Preservation: The Scheme for Cold Chain, Value Addition, and Preservation Infrastructure was approved in 2008 with an *objective* to provide integrated and complete cold chain, value addition and preservation infrastructure facilities without

any break, for perishables from the farm gate to the consumer. The assistance under the scheme includes financial assistance (grant-in-aid) of 50 per cent of the total cost of plant and machinery and technical civil works in general areas and 75 per cent for the North Eastern region and difficult areas (subject to a maximum of Rs. 10 crore).

Modernisation of Abattoirs: The Ministry has approved 10 projects in first phase which are at various stages of progress. Two projects have been completed. A proposal for up-scaling the scheme is under consideration.

Technology Upgradation: Under the Scheme for Technology Upgradation, Establishment, Modernisation of FPIs, financial assistance is provided in the form of 'grants-in-aid' for the setting up of new food processing units as well as technological upgradation and expansion of existing units in the country. The GoI extends financial assistance in the form of grant-in-aid to entrepreneurs at 25 per cent of the cost of Plant & Machinery and Technical Civil Works subject to a maximum of Rs. 50 lakhs in general areas or 33.33 per cent subject to a maximum of Rs. 75 lakhs in difficult terrains. The Scheme has now been transferred to the states with the launching of the National Mission on Food Processing (NMFP) in the 12th Plan.

Quality Assurance, Codex Standards and R & D and Promotional Activities: In the global market today, quality and food safety gives a competitive edge which is an important factor for the enterprises producing processed foods and providing services. Apart from domestic standards for food products, processes and management practices, Codex prescribes international standards for safety and quality of food as well as codes of good manufacturing practices, which are accepted worldwide. Further, equal emphasis is required to be accorded to R&D activities for the development of innovative products, cost effective processes and efficient technologies for the food processing sector. The scheme for Food Safety Codex and R&D has been successful in making a dent in this area in the country.

Human Resource Development: The human resource development is very critical for sustained growth in the sector. Extensive training and entrepreneurship development is given top priority:

(i) Creation of infrastructural facilities for running degree/diploma courses in food processing

(ii) Entrepreneurship Development Programmes (EDP)

(iii) Setting up of Food Processing Training Centres (FPTC)

(iv) Training at recognised national/state-level institutes, etc., sponsored by MoFPI or other training programme

Strengthening of the Indian Institute of Crop Processing Technology (IICPT): Indian Institute of Crop Processing Technology (IICPT) formerly known as Paddy Processing Research Centre (PPRC), Thanjavur is an autonomous organisation under the administrative control of MoFPI. It has been in existence for the last three decades. As other commodities such as millets, pulses and oil seeds are gaining importance, it was decided in 2001 to expand the mandate of this Institute to include the above commodities also. The institute is being upgraded into a national level institute now.

National Meat and Poultry Processing Board (NMPPB): The GoI established the National Meat and Poultry Processing Board 2009. The Board is an autonomous body and was initially funded by the GoI for 2 years and is be managed by the industry itself. This industry-driven institution has been launched to work as a ***National Hub*** for addressing all key issues related to the meat and poultry processing sector for its systematic and proper development. The Board serves as a

single window service provider for producers, manufacturers and exporters of meat and meat products, for promoting the meat industry as a whole.

Indian Grape Processing Board: The GoI, in 2009, gave its approval for the establishment of the Indian Grape Processing Board (IGPB) at Pune, Maharashtra which is close to the principal grape growing and processing areas in the country. The functions and objectives of the IGPB are:

(a) To focus on R&D, extension, quality upgradation, market research, information, domestic and international promotion of *Indian wine.*

(b) To foster sustainable development of Indian wine industry.

(c) To formulate a vision and action plan for the growth of Indian wine sector including R&D for quality upgradation in new technologies.

During three years of its existence, the Board has focused on the promotion of ***Wines of India*** in the domestic as well as international market by participating in important and relevant exhibitions, fairs, consumer awareness and training programmes, undertaking advocacy work with the various state governments/central ministries on various issues related to taxes/levies and promotion aspects. The Board is going to implement a traceability programme "wine-net" for standards and quality in wine sector.

National Institute of Food Technology, Entrepreneurship & Management (NIFTEM): For developing a vibrant food processing sector, India needs not only world-class food technologists to undertake R&D in frontier areas, develop new products, processes, technologies and machineries, set food standards and protocol testing, but also business leaders and managers well versed with the requisite mix of technologies, management and entrepreneurship who can exploit major opportunities in the expanding global food trade.

In the emerging global scenario, there is a need for setting up of an institution of global excellence, which could cater to the needs of the booming food processing sector, various stakeholders such as entrepreneurs, industry, exporters, policymakers, government and other research institutions. NIFTEM was conceived by MoFPI to create an international *Center of Excellence* in the field of Food Sciences & Food Technology. NIFTEM will grow into an apex world class institute to promote cooperation and networking among existing institutions both within the country and various international bodies. The institute will offer high quality educational, research and management programme specific to the food industry, provide referral advise on food standards, disseminate knowledge on the food sector and provide business incubation facility. It is situated (2006) at Kundli, Sonipat (Haryana).

National Mission on Food Processing (NMFP): India enjoys a 'competitive advantage' in food processing sector given its huge production base of a number of agricultural, dairy, fishing and horticultural items. To ensure that this sector gets the stimulus it deserves, the MoFPI has been implementing a number of schemes for infrastructure development, technology upgradation and modernisation, human resources development and R&D in this sector. In the context of the *12th Plan*, it is felt that there is a need to decentralise the implementation of schemes through involvement of the states/UTs for better outreach, supervision, monitoring and ensuring job creation. Accordingly, National Mission on Food Processing (NMFP) was launched as a centrally sponsored scheme in 2012. The NMFP contemplates establishment of a National Mission as well as corresponding Missions at the state and district levels.

The Challenges: The most important challenges among others in the sector include avoidance of

the significant 'wastage' at every level and in value addition. High food inflation, high post-harvest wastage particularly in fruits and vegetables, low level of processing, etc., are the main challenges in the food processing sector. Addressing these core concerns by reducing wastage of food, increasing shelf life and enhancing value of agricultural produce are some of the objectives of the food processing industry. In terms of employment, the contribution of the sector is significant. Presently, the total number of *persons employed* in the food processing sector is about 17 lakh. The National Manufacturing Policy, 2011 seeks to give special attention to food processing industries to ensure job creation. To promote industrial growth along with the objective of inclusive growth the food processing sector will get higher attention from the government.

OUTLOOK FOR THE FUTURE

So that the FPI expands as per the expectations emphasis is needed on the following fronts:

(i) Given the need for *wastage reduction*, *value addition* and the *high employment* potential of the sector, there is a need to substantially step up the allocations given the importance of the sector in terms of its contribution to the economy.

(ii) There is also a need for greater *involvement of state* governments for better outreach, supervision and monitoring (keeping this in view, government has already launched centrally sponsored National Mission on Food Processing).

(iii) There is a need for greater emphasis on creation of infrastructure with full participation of state governments and *private sector*. The main infrastructure schemes for setting up food parks and cold chains are at present 'closed ended'. This should be 'open ended' permitting the Ministry to fund all the viable projects proposals received under these schemes rather than limiting the number of projects.

(iv) The credit dimension of the sector is also a vital issue.

With the idea of 'Team India' under the NITI Aayog, it is believed that a new synergy will come to the food processing industry. The nature of industry requires active participation from not only the concerned states, but the loacal bodies, too. Experts believe that the emerging emphasis by the government on the issue of 'ease of doing business' will be of great help to the sector.

CURRENT AGRICULTURAL SCENARIO

The agriculture sector has remained the least reformed area in the reform era. There has been several socio-economic reasons behind it. In the meantime, the sector still plays a big role in the proper functioning of the economic system even if it contributes just around 14 per cent to the national income. As per the *Economic Survey 2014–15,* the outlook and challenges regarding the sector are as given below:

1. The inflation is not expected to rise significantly from the current levels as—
   (i) The oil prices are expected to remain low in the coming months on account of weak global demand and increased supplies.
   (ii) Global commodity prices have generally been declining and are expected to remain weak in 2015 due to low demand and comfortable supply.
   (iii) Factors like high rural wages, higher level of MSP, and rise in input cost have been instrumental for higher inflation in the last few years. At present, growth of all these have been slowed down considerably and this

could result in keeping *food inflation* within limits.

2. Agriculture and food sector needs huge investment in research, education, extension, irrigation, fertilizers, and laboratories to test soil, water and commodities, warehousing, coldstorage.
3. Rationalisation of subsidies and better targeting of beneficiaries would generate part of the resources for public investment.
4. There are wide differences in the yields within states. Even the best of the states have much lower yield in different crops when compared to the best in the world. This provides ample opportunity to increase production by bridging the yield-gap to the extent feasible within the climatic zone.
5. The focus of public expenditure for agriculture so far has been on provision of subsidies (public expenditure in agriculture is only one-fourth of expenditure towards food and fertilizer subsidies) and it is time it shifted towards investments to boost productivity.
6. Recommendations of the Shanta Kumar Committee provide useful suggestions for the future road-map of food-policy. Every effort should be made to bring states on board for creating national common market for agricultural commodities.