CHAPTER 08

AGRICULTURE AND FOOD MANAGEMENT

*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.**

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* 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 ***17.4 per cent of the GDP***.[1] In the fiscal 1950–51 agriculture accounted for 55.4 per cent of 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 ***49 per cent*** of the 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 49 per cent of the population lives with only 17.4 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 of the 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 (93.4 per cent of the total labour force of the economy, i.e., 39.8 crores is employed in the unorganised sector).[3]

(v) India has emerged as a significant agri-exporter in few crops, namely—cotton, rice, meat, oil meals, spice, guar gum meal and sugar. As per[4] the *WTO's Trade Statistics*, the share of India's agricultural exports and imports in the world trade in **2016** were 2.40 per cent and 1.40 per cent, respectively. Agricultural exports as a percentage of agricultural GDP increased from 7.95 per cent in 2009–10 to 12.5 per cent in 2016–17. During the same period, agricultural imports as a percentage of agricultural GDP also increased from 4.90 per cent to 6.1 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]

(vii) The industrial sector was selected as the ***'prime moving force'*** of the economy in

1. ***Ministry of Agriculture***, GoI, N. Delhi, February 2018.
2. ***Ministry of Finance***, GoI, N. Delhi, February 2017.
3. ***Labour Bureau***, Ministry of Labour and Employment, Government of India, N. Delhi, February 2018.
4. ***Trade Statistics***, WTO, Geneva, Switzerland, February 2018.
5. This corelation has been pointed out by many great economists in India since 1960s, for example, by ***Raj Krishna (1976), S. Chakravarty (1974–79)*** and ***C. Rangarajan (1982)*** to quote some of the most important names.

the late 1940s. But due to market failure the sector failed to lead the economy after independence. 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 only in 2002.[6]

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

(ix) In 2017-18 foodgrains production is estimated to be a record 277.49 million tonnes of which is around 7 per cent higher than the total production of 2015-16 (252.23 MT)[8].

(x) **Productivity** of major crops are lower in case of India in comparison to the world's best practice. Though it has been improving with a slow pace, the productivity of rice, wheat and pulses improved from 2,202 kg, 2,900 kg and 625 kg per hectare of 2007–08 to 2,390 kg, 2,872 kg (falling from 3,026 kg of 2011-13) and 744 kg per hectare in 2016-17.[9]

(xi) A total of 66.1 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 *jayads*.

Pakistan and Bangladesh are two other countries that are using the term 'kharif' and 'rabi' to describe 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:

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.

6. Planning Commission, ***Approach Paper to the Tenth Five Year Plan*** (New Delhi: Government of India, 2002).
7. This was the general opinion of the experts throughout the 1990s, but the official document which accepted this contention was the ***Foreign Trade Policy 2002-07,*** of the Ministry of Commerce. This View continued with the govenment in all its forthcoming trade policies till about four decades.
8. ***Ministry of Agriculture***, GoI, N. Delhi, March, 2018.
9. ***Ministry of Agriculture***, GoI, N. Delhi February 2018.
10. Ministry of Finance, ***Economic Survey 2015-16,*** Vol. 2, p. 103.
11. ***Indian Council of Agricultural Research (ICAR),*** N. Delhi, 1998.

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 with regard to food.

THE SECOND PHASE

Meanwhile India was celebrating its success of the first phase, a new challenge confronted the country—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 activity 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.

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

12. Publication Division, **India 2000** (New DelhI: Government of India, 2001); Ministry of Finance, ***Economic Survey 2000–01***, (New DelhI: Government of India, 2001).

13. ***Brundtland Report*** on Sustainable Development after the deliberations at the summit ***"Our Common future",*** 1987.

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 the following 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 land ownership in the economy on logical grounds and with public welfare approach. This objective of 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 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.

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

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

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 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 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 provided tenants with rights, but only on 4 per cent of the total operated areas in the country (14.4 million hectares of operated area by 11 million tenants by 1992).

(ii) Redistribution of ownership rights of land took place, but only upto 2 per cent of the total operated area in 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 for the route of increasing, productivity to reach the same goal, i.e., initiation of new techniques of agriculture.

REASONS FOR FAILURE OF LAND REFORMS

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

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

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

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 Green Revolution 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 thinking of the Government of India 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-utilising businesses to set up. Perhaps, as important, it could allow land to serve as collateral for credit.

The **National Land Records Modernisation Programme** (NLRMP), started in 2008, aims at updating and digitising land records by the end of the Twelfth 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:

(i) 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.

(ii) 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.

(iii) 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.

(iv) 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.

(v) 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.

(vi) 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 Government of India passed the *Land Acquisition Bill, 2013*. The bill, besides proposing to amend the *Land Acquisition, Rehabilitation and Resettlement Act, 2011* proposed to put in place a transparent, effective and speedy laws regarding 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)*, which 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]

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

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

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

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

17. The discussion is based on several volumes of the ***Economic Survey*** and ***India*** published by the Government of India between the period 2010 to 2017 and the **12th Plan**.

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

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

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

Meanwhile, the Model Land Leasing Law proposed by the NITI Aayog in 2016 is giving encouraging results in the states.

(iv) In the 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 effective land leasing and acquisition policies.

(v) 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.

(vi) 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 Government of India has changed its orientation towards the issue of land reforms, the states in 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 the 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, as 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 total 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 of the *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 the 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:

1. The HYV Seeds

These seeds 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 in high yield.[19]

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

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

19. ***International Maize and Wheat Improvement Centre*** (CIMMYT), Mexico, 1971.

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 fertilisers, were required, which could be given to the targeted seed only—the only option was the chemical fertilisers—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.

20. This made it compulsory to use highly concentrate chemical fertilizers, pushing the traditional organic fertilizers (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.

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.

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,

22. Publication Division, India 2002 (New Delhi; Government of India, 2013).

23. See Various volumes of the ***Economic Surveys,*** specially 1985–86 to 1994–86 to 1994–95, published by the Government of India.

oilseeds, maize, barley on the margins, etc., were negative impacts.

2. Ecological Impact

The most devastating negative impact of the Green Revolution was ecological. 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 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.

24. Based on various empirical studies in the 1990s conducted separately by ***Vandana Shiva, C.H. Hanumantha Rao, ICAR, Planning Commission, etc.***

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) revolution, which is today known among the experts with many more names—the *evergreen revolution,* the *second;* green revolution and *green farming.*

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 the 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 the 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 the 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 the 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 ha),

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

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

They together are 90 per cent of the 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 *commercial* 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 the influence of all the above factors, te 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 throughout the country. Based on the 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 trial and error 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 popularly as the Green Revolution, 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 the GR regions we see a highly repetitive kind of cropping pattern with the 'wheat-rice' having predominance. In coming times, the Government of India 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-sufficiency in foodgrains. We see the emergence of big farmers in the GR regions for whom at least farming did not remain subsistence —*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 Government of India officially adopts the idea of *sustainable* agriculture by 1997.

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

- The issue of food security continued to give pressure on policymakers as 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 Government of India 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, 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 affects of global competition and enable Indian agriculture to expand exports.

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

(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 subsistence farming and issues related with the high agriculture subsidies, which developed countries forward to their farm sector.

(v) Evolving the right environmental policy framework for the initiation of GMFs in the farm sector and promotion to the non-GMF related research and development in the country, through corporate participation.

(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 availability of green inputs.

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

(x) Immediate inclusion of other factor 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:

(i) The livestock sector as a whole achieved an average growth rate of 4.5 per cent during the *12th Plan* which is *higher* than the farm sector growth (3.5 per cent) and the foodgrains growth (around 1 per cent).

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

(iii) 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 there is enormous scope of expansion.

Dairy Sector: India ranks first in the world in milk production with a production of around 155.5 million tonne and the per capita availability (pca) of 326 grams (world pca is 296 grams) by the end of 2015–16.

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:

(i) Improving productivity of milch animals,

(ii) Strengthening and expanding village-level infrastructure for milk procurement, and

(iii) 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 the North-Eastern states by rearing 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 scheme are:

(i) Encourage commercial rearing by adopting scientific methods and infrastructure creation;

(ii) Production and supply of improved germ plasm;

(iii) Organise stakeholders to popularise scientific practices;

(iv) Create supply chain for the meat industry;

(v) Encourage 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 2014 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 in the public sector and rest in the 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.

(i) Developing progeny tested semen for artificial insemination.

(ii) Expansion of fodder availability through innovative means.

(iii) Facilities of animal health centres need to be upgraded and the disease control systems made more effective on the veterinary side.

(iv) In the drylands and mountain ecosystems, livestock contribute anywhere between 50 to 75 per cent of the total household income of the rural population. Support to these massive and highly diverse livestock populations in these regions is lacking.

(v) Raising the capability of the rural poor to conserve and manage their livestock resources, and enables them to derive sustainable incomes from these resources.

(vi) 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 for producing surplus and competing with the world, so that the benefits of globalisation could also be reaped by the agriculture sector. This section discusses the challenges to management of food in the country.

MINIMUM SUPPORT PRICE

Minimum Support Price (MSP) is a form of market intervention by the Government of India 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 1966–67, 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:

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

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

(iii) 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 the state/UT governments, if the states/UTs are 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 Government of India announced a 'procurement price' for wheat, 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 to encourage 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 also considered the effective procurement price.[26]

Issue Price

The price at which the government 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 transportation, goodowning, 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 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 maintaining 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

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.

28. Ministry of Finance, ***Economic Survey 2014–15,*** Vol. 2 (New Delhi: Government of India, 2015), p. 85.

coming into force of the National Food Security Act (NFSA). The new norms are as given in the table below:

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 for the purpose of market intervention by the government.

DECENTRALISED PROCUREMENT SCHEME

The decentralised procurement (DCP) scheme was operationalised by the government in 1997 (together with the Centre and some of the states also procure foodgrains from the farmers, locally). Under this scheme, the designated states procure, store and also issue foodgrains under the TPDS. The difference between the economic cost of the states and the central issue price (CIP) is passed on to the states by the Government of India as subsidy. The decentralised 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 Government of India 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 Government of India 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.

(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:

(i) 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.

(iv) Cold storage capacity for all type of food items is just 29 MT *(Planning Commission*

29. Ministry of Finance, ***Economic Survey 2011–12***, (New Delhi: Government of India, 2012).

30. Ministry of Finance, ***Economic Survey 2014–15***, p. 84.

2012). The production of potato alone is about 35 MT.

(v) 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 Government, the economic costs of wheat and rice in 2017–18 are estimated to be over Rs. 32 and Rs. 24 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 pre-determined 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:*

(i) to enhance market supply of foodgrains;

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

(iii) to offload surplus stocks.

Under the Open Market Sale Scheme (Domestic), the government now adopts 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 during the lean season does not increase much and inflation remains under check.

Price Stabilisation Fund

The Government of India, 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-horticultural commodities. The cost to be borne between the centre and the 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.

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 directly, through the ***Direct Benefit Transfer (DBT)*** since 2015–16 onwards.

FOOD SECURITY

India attained self-sufficiency in food by late 1980s, though food security still evades the country. Food security means making food available at affordable prices at all times, to all, without interruptions. Though India's GDP growth has been impressive and the agricultural production has also increased over the past few decades, hunger and starvation still persist among the poorer sections of the population.

Lack of food security hampers the nutritional profile of the vulnerable section of the population. Calorie and protein intake of a large number of people in India, specially in rural areas, are lower than normal.[31] As per the *State of Food Insecurity in the World, 2015 (FAO)*, India has the second highest number of undernourished people at 194.6 million which is around 15.2 per cent of the world's total undernourished population.

Two important things need attention regarding India's food security –

(i) Around 27 per cent of India's population is BPL and a greater portion (one conservative estimate puts it at 75 per cent) of their household income is spent on food.

(ii) There is a strong correlation between stability in agricultural production and food security. Volatility in agricultural production impacts food supplies and can result in spikes in food prices, which adversely affect the lowest income groups of the population.

Therefore, along with provision of food subsidy, stability in agricultural commodity prices is essential for making the poorer sections food secure. It means, in the direction of assuring food security, India needs to tackle mainly two hurdles–

(i) *Enhancing its food production*: If food (i.e., foodgrains) is to be supplied to all today India will face deficit of around 30 million tonnes of foodgrains. This shows the food insecurity dimension of India.

(ii) *Strengthening supply chain:* Managing the issues like storage, transportation, proper retailing and integrating the segmented agri-markets into a national agrimarket.

Due to high level of undernourishment and volatility in agricultural prices, India has one of the largest number of food schemes in the World to ensure food security –

31. 66th Round (2009-10) and 68th Round (2011-12) of the **NSSO**, as quoted by the **Economic Survey 2015-16**, op. cit., Vol. 2, p.117.

(i) There is entitlement feeding programmes like the Integrated Child Development Scheme (ICDS – covers all Children under six, pregnant and lactating mothers)

(ii) Mid Day Meal Schemes (MDMS),

(iii) Food subsidy programmes like the Targeted Public Distribution System (through which the National Food Security Act is being implemented)

(iv) Annapurna (10 kgs of free food grain for destitute poor) and the

(v) Employment Programmes like Mahatma Gandhi National Rural Employment Guarantee Scheme (100 days of employment at minimum wages) to ensure food security.

Till the vulnerable population is not enabled with the market-linked purchasing capacity, these programmes will be relevant in case ensuring food security in the country. There is a need to run these schemes with utmost focus of the beneficiaries.

PDS & FOOD SUBSIDY

The Public Distribution System (PDS was changed to Targeted PDS in 1997) strives to ensure food security through timely and affordable distribution of foodgrains to the BPL population as this section can not afford to pay market prices for their food. This involves procurement of foodgrain at MSP by the Government, building up and maintenance of food stocks, their storage, and timely distribution, making foodgrains accessible at reasonable prices to the vulnerable sections of the population.

However, the system of PDS has many weaknesses leading to leakages and targeted beneficiaries being left out of the system. The PDS incurs high costs for procurement, storage and distribution of foodgrains. There is scope to increase efficiency of the PDS operations and reduce costs. Only a small proportion of the public expenditure/subsidy on PDS reaches the beneficiary. There is a case for introducing **DBT** (Direct Benefit Transfer) for consumers of food and kerosene as is under way in *Andhra Pradesh*. Though, there are challenges in implementing DBT.

As per the **Economic Survey 2016-17,** despite increased procurement of food-grains offtakes from PDS have been declining in past few years. This suggests that despite enhanced availability in the PDS and high inflation in foodgrains, dependence on the PDS is reducing – this could be only due to two reasons –

(i) Foodgrains are not made available timely by the PDS, and/or

(ii) Quality of the PDS foodgrains are inferior in comparison to their counterparts in the open market.

There are certain anomalies in India's food management under the PDS which need immediate attention –

(i) The percentage distribution of the economic cost of wheat and rice has been rising fast. The pooled cost of foodgrains *(MSP plus the Bonus which are offered by the individual states)* accounts for *two-thirds* of the economic cost of wheat and rice. This has made the economic cost of foodgrains to the Food Corporation of India (FCI) increase over the years.

(ii) Increasing costs of labour, fertilizers, pesticides and other inputs have made production of crops costlier over the time. This forced the government to keep on increasing the MSPs of the crops, too.

(iii) The increase in the food subsidy bill is determined by the rate at which the MSPs for wheat and rice increase and the *economic cost* of handling grains (their procurement, stocking and distribution to the targeted households). This has been the major factor for ballooning

food subsidy bill. Food subsidy bill has increased to over **15** per cent of agri-GDP by 2016-17 from 5 per cent of 2005-06 (as per the *Commission for Agricultural Costs and Prices-CACP*).

(iv) The procurement incidentals of wheat and rice consist of costs related to mandi charges and taxes, cost of gunny bags, *arhatiya* commission, *mandi* labour, forwarding charges, internal movement, storage charges, interest, administrative charges and others. Out of these costs, *mandi* charges and taxes constitute more than **40** per cent of the total costs.

Opportunity cost of running the PDS have been very high. This is particularly due to increased levels of fund diversion for food subsidy, the government could not support adequate amount of investment in the agricultural sector. This prevented capacity building in the sector.

Over the time, several discrepancies seeped into the PDS, such as,

(i) high operation costs,
(ii) high levels of leakages,
(iii) high administrative costs,
(iv) corruption, and
(v) mismanagement.

Subsidies created some other problems, too. *Firstly,* subsidies brought distortions in the market, which hamper the domestic as well as the external interests and *secondly,* caused a heavy drain on the government exchequer. PDS poses even higher challenge when domestic or international prices are on the rise and the government is forced to raise the MSPs of crops.

AGRICULTURE MARKETING

India's agrimarket 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 from buyers, and they also 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 vary widely in the states. Statutory levies/mandi tax, VAT, etc., are a major source of market distortions.

- 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 the state legislature to utilise the funds thus collected. Thus, APMC operations are independent of 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 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, 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 its line. 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 APMCs;

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

The central government is closely working with state governments to re-orient states' APMC Acts in order to provide for establishment of private market yards/private markets. As per the **Union Budget 2017–18** and **Economic Survey 2016-17** some of the **recent initiatives** taken in this regard are as follows:

(i) A comprehensive advisory issued to the 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) The **NAM** (National Agriculture Market) through an Agri-Tech Infrastructure Fund (ATIF) has been established by Government of India in July 2015, which will be implemented up to 2017–18. NAM will provide a common ***e-market platform*** of regulated wholesale markets in states/UTs (those states /UTs that are desirous to joint he platform). The SFAC (Small Farmers Agribusiness Consortium) will implement this e-platform and will cover 250, 200 and 135 **mandis** during 2015–16, 2016-17 and 2017–18 respectively.

The DAC & FW (Department of Agriculture, Cooperation Farmers Welfare) will meet expenses on software and its customisation for the regulated mandis of the states/UTs **free of cost.** To Integrate with the NAM, the APMCs of the states/UTs will need to meet certain pre-requisites, which are given below:

(a) a single license to be valid across the states,

(b) single point levy of market fee, and

(c) provision for electronic auction as a mode for price discovery.

Majority of the states and all of the UTs have shown their interest to join the e-platform.

(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

32. Other states like Maharashtra, Tamil nadu and Andhra Pradesh did also for reforms in their APMC's taking clues from the Modekl APMC Act—making these states also to have some synergy coming into their agriculture market.

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 its activities in other states based on the outcome of the experience of the Delhi kisan mandi.

SAFEGUARDING AGRITRADE

In recent times, India has become more conscious towards protecting its agricultural trade interests at the international platforms. At the *10th Ministerial Conference* of the WTO (Nairobi, December 2015), the Government of India adopted the following approach towards agritrade policy:

(i) A Special Safeguard Mechanism (SSM) for developing countries.

(ii) Public stockholding food for security purposes,

(iii) A commitment to abolish export subsidies for farm exports, and

(iv) Measures related to cotton.

Decisions were also taken regarding preferential treatment to LDCs in the area of services and the criteria for determining whether exports from LDCs may benefit from trade preferences.

Policy stability: The changes in the agritrade policy hampers the concept of a market and needs to be discontinued with, due to the following reasons[33]:

(i) Frequent changes in the policy parameters (goal posts) of trade in agricultural products in the form of changes in import duties and minimum export prices, etc., create instability of policy for any investment in the *agro-processing* industry.

(ii) The changes in policy parameters have limited impact on the price the consumer pays, because of the time taken to arrive at the decision and the same translating into additional/reduced supplies.

(iii) It certainly does not impact the farmer who has received his remuneration based on the price prevailing at the time the produce leaves the farm gate.

(iv) High prices of commodities in a particular year do not translate into benefits to the farmer in the same year, but create expectations, possibly not rational, of the same in the next year, enhancing cropped area in the next year/cropping season, leading to oversupply and reduction in prices and consequently of incomes.

COMMODITY FUTURES MARKET

By the early 2017, 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 20 per cent in 2015–16, with food items (refined soya oil, soyabean, chana, coriander and rapeseed/mustard seed) contributing over 50 per cent of it. The remaining (80 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, and 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

33. Ministry of Finance, ***Economic Survey 2015–16,*** Vol. 2, p. 122.

strengthened at the earliest. The Government of India 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.

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 uninterrupted functioning, depend heavily on the upstream and downstream requirements. In the case of ***India***, we find several bottlenecks in both the processes:

(i) In the 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.

(ii) 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 fragmented.

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

(iv) In the case of agricultural products, the situation is even worse. Agrimarkets of regulations by the APMCs did not allowed India to establish a common and single market. This has hampered not only the growth and business prospects, 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.

(v) As India is to compete in the global market, it immediately needs to strengthen 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 services, 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 output 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 could be integrated. 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, such as:

(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.

FDI IN UPSTREAM, DOWNSTREAM AND SUPPLY CHAIN MANAGEMENT

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 in the agriculture market. This is the reason why the Government of India has allowed more freedom to FDI in retail chain development. It is expected that the willing foreign firms will not only bringing the needed fund to the sector, but alongwith 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 of 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:[34]

(i) Conducted awareness programmes in 2011, such as a media campaign under the ***Jago Grahak Jago Programme*** about 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 stakeholders, 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,[35] 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. 92,651 crore (at the prices of 2014), that is around 9 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 Government of India 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 government has said that adoption of better technology has brought about a reduction in losses.

IRRIGATION

The Planning Commission[36] 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

34. Ministry of Finance, ***Economic Survey 2011–12,*** p. 199.

35. ***Central Institute of Post-Harvest Engineering and Technology (CIPHET),*** ICAR, Ministry of Agriculture, GoI, Ludhiana, Study released in September, 2016.

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

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 (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.

There is **need** to expand the acreage under irrigation along with adoption of appropriate technologies for efficient utilisation of water through suitable pricing to raise agricultural productivity in India. This could be done through– (i) Adoption of irrigation technologies which improve efficiency in the use of water is imperative in a scenario where flood irrigation has resulted in wastage of water. (ii) Focus on efficient irrigation technologies is important with increasing water shortages owing to climate change and indiscriminate wastage of water in agriculture and other uses.

Having *'more crop per drop'* through efficient irrigation technologies should be the motto to improve productivity in agriculture which can ensure food and water security in the future.

Irrigation Potential & Use

As per the latest available data[37] on irrigation, the all India percentage distribution of net irrigated area to total cropped area during 2012–13 was 33.9 per cent. There is regional disparity in irrigated farming, with net irrigated area to total cropped area at more than 50 per cent in the states of Punjab, Tamil Nadu and Uttar Pradesh, while it is at less than 50 per cent in the remaining states. There is need and scope for increasing the coverage of irrigated area across the country to increase productivity in agriculture. The total UIP (Ultimate Irrigation Potential) of India is about **140** million hectares (Mha). There is substantial gap between IPC (Irrigation Potential Created) and IPU (Irrigation Potential Utilized). There is perceptible decline in the ratio of IPU to IPC mainly due to:

(i) lack of proper operation and maintenance,
(ii) incomplete distribution system,
(iii) non-completion of command area development,
(iv) changes in cropping pattern, and
(v) diversion of irrigated land for other purposes.

There is need to arrest the declining trend in efficient utilization of irrigation potential and also reverse it. A larger share of funds available under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and other employment generating schemes need to be deployed for promotion of irrigation—*for creation and maintenance of community assets, de-silting and repair of tanks and other water bodies.*

Irrigation Efficiency

Agricultural productivity can be boosted in a big way by enhancing irrigation efficiency in the use of irrigation systems. Over the time, the conventional systems of irrigation have become non-viable in many parts of India[*38] due to:

(i) increasing shortages of water,
(ii) wastage of water through over irrigation, and
(iii) concerns of salination of soil.

Economically and technically efficient irrigation technologies like – ***drip*** and ***sprinkler***

37. Ministry of Finance, **Economic Survey 2015–16,** Vol. 2, P. 103.

38. NITI Aayog, *Task Force on Agriculture*, 2015, as quoted Ministry of Finance, **Economic Survey 2015–16**, Vol. 2, p. 104.

irrigation – can improve water use efficiency, reduce costs of production by reducing labour costs and power consumption. [One of the objectives of the *PMKSY* (Prime Minister's Krishi Sinchai Yojana) is to enhance on-farm WUE (Water-Use-Efficiency) spatially and temporally to reduce wastage by promoting precision irrigation like sprinkler, drip etc.] There good instances of MI (Micro Irrigation) technology in enhancing irrigation efficiency and cutting costs[39] –

(a) The adoption of *sprinkler irrigation* resulted in 35 to 40 per cent savings of irrigation water in the cultivation of groundnut and cotton in Gujarat, Karnataka and Andhra Pradesh.

(b) The adoption of *drip irrigation* resulted in 40 to 65 per cent savings in water for horticulture crops and 30 to 47 per cent for vegetables. Such examples need to be emulated by other areas/crops in these states and in other states for a larger basket of crops.

WATER PRODUCTIVITY

Water productivity in India is very low. The overall irrigation efficiency of the major and medium irrigation projects in India is estimated at around 38 per cent. As per the ***NITI Aayog***, efficiency of the *surface irrigation* system can be improved from about 35-40 per cent to around 60 per cent and that of *groundwater* from about 65-70 per cent to 75 per cent. Water productivity needs to be enhanced by the following methods –

(i) tapping, harvesting and recycling water,
(ii) efficient on-farm water management practices,
(iii) micro irrigation,
(iv) use of waste water, and
(v) resource conservation technologies.

39. *National Committee on Plasticulture Applications in Horticulture* study has been quoted by Ministry of Finance, **Economic Survey 2015–16**, p. 104

In order to promote judicious use of water ensuring ***'more crop per drop'*** of water in agriculture for drought proofing, the GoI recently launched the PMKSY aiming at providing water to every field of agriculture

FARM MECHANISATION

India needs to introduce better equipment for each farming operation in order to reduce drudgery, to improve efficiency by saving on time and labour, improve productivity, minimize wastage and reduce labour costs for each operation. Agricultural mechanisation in case of India is increasingly needed as:

(i) Due to shortage of labour for agricultural operations owing to rural-urban migration, shift from agriculture to services and rise in demand for labour in non-farm activities, there is need to use labour for agricultural operations judiciously, which makes a strong case for mechanisation of farming.

(ii) Indian agriculture has a high proportion of female workforce in both the cultivation and processing stages of farming. Therefore, ergonomically designed tools and equipment for reducing drudgery, enhancing safety and comfort and also to suit the needs of women workers would help in better adoption of technologies in agriculture.

Some *important facts* regarding mechanisation of the farm sector in India:

(i) Although India is one of the top countries in agricultural production, the current level of farm mechanisation, which varies across states, averages below 50 per cent as against more than 90 per cent in developed countries *(Economic Survey 2015–16).*

(ii) The farm mechanization in India has been growing at a rate of less than 5 per

cent in last two decades*(Economic Survey 2014–15).*

(iii) Tractor penetration in the country is 38 per cent for large farmers (with more than 20 acres), 18 per cent for medium farmers (5–20 acres) and just around 1 per cent for marginal farmers.[40]

(iv) The economic benefit of adoption of improved implements is about Rs. 83,000 crore per annum, which is only a small fraction of the potential *(NITI Aayog, 2016).*

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

Two important and contemporary policy **suggestions**[41] may be given in this regard:

(i) Due to increased fragmentation of landholdings and low rates of tractor penetration among small farmers, there is need for a market in *tractor rentals*, akin to cars and road construction equipment, driven by private participation.

(ii) Appropriate farm equipment which are durable, light weight and low cost, region, crop and operation specific using indigenous/adapted technologies need to be made available for small and marginal farmers to improve productivity.

SEED DEVELOPMENT

Seed is the basic input for increasing productivity in agriculture. It is estimated that the quality of seed accounts for 20 to 25 per cent of productivity.[42] Thus, the adoption of quality seeds needs promotion in India. There are multiple challenges to the development and adoption of quality seeds in the form of –

(i) Inadequate research inputs for development of new seeds especially,

(ii) Early ripening and resistant (to pest, moisture variations, etc.) varieties,

(iii) High cost of seeds for small and marginal farmers,

(iv) Shortage of supply of quality seeds,

(v) Non-resolution of issues related to adoption of Genetically Modified Seeds, and

(vi) Inadequate number of players restricting competition.

The **issues**[43] that require immediate attention are:

(i) *Affordability:* Open pollinated varieties of seeds can be developed by farmers from their own harvested crops. However, for high-yielding hybrid varieties, the farmer has to depend on the market for each crop which gets very costly for the small and marginal farmers.

(ii) *Availability:* Quality seeds have shortage in supply. While there is a demand for banning non-certified seeds, certification *per-se* does not ensure quality seeds. Presence of more players (both public and private) and competition in the market for seeds would improve this situation.

(iii) *Research and Development of Seeds and Seed technology:* The first Green Revolution

40. *Agricultural Machinery and Manufacturers Association in India (AMMAI)* was quoted in the **Economic Survey 2015-16**, op. cit., Vol. 2, p. 105.

41. Ministry of Finance, **Economic Survey 2015–16**, p. 105.

42. As per the *DAC&FW (Department of Agriculture, Cooperation & Farmers Welfare)* – as quoted by the **Economic Survey 2015-16**, Vol. 2, p. 105.

43. Ministry of Finance, **Economic Survey 2015–16**, pp. 105-107.

was driven by indigenously developed High Yielding Varieties (HYVs) of seeds for paddy and wheat. Inadequate research and genetic engineering has been a constraint in the development of seeds and seed technologies in major crops during the past few decades in India. There is need to encourage development of seed technologies in both private and public sectors to initiate another round of Green Revolution. This development should cover all agricultural segments.

(iv) *GM crops and seeds:* Concerns about its affordability, environmental and ethical issues, risks to the food chain, disease spread and cross pollination have resulted in their non-introduction.

FERTILISERS

In improving agricultural output, fertiliser is a critical and expensive input. Since the Green Revolution (mid-1960s), there has been a sharp increase in the use of fertilizers in India. To facilitate and promote the use of fertilizers, the Government has been providing fertilizer subsidy to farmers. Today, the fertiliser subsidies stand at around **10** per cent of the total agricultural GDP.[44]

However, the use of fertilisers has not resulted in commensurate growth in agricultural productivity. The declining response ratio or marginal productivity of fertilisers since the 1970s is a pointer to their inefficient use in Indian agriculture. The yield of grain per kilogram use of NPK fertilizer has declined from 13.4 kg grain per ha in 1970 to 3.7 kg grain per ha in irrigated areas by 2005.

In the post Green Revolution agriculture scenario, there have been **imbalances** in the use of fertilizers such as –

(i) Excessive dependence on urea owing to low/distorted prices of fertilisers, especially urea and regional imbalance in the use,

(ii) Neglect/low use of compost, manure and other forms of natural nutrient providers,

(iii) Discontinuing practices of inter and rotational cropping.

(iv) Diversion of the subsidised fertilisers to non-agricultural use.

(v) Indiscriminate use of fertilisers has not proportionally improved the yield of crops, but has resulted in the depletion of soil fertility and salination of soil in many areas.

There is need to rationalise fertiliser subsidy in an *input, crop and region neutral format* and minimise diversions. The disbursal of subsidy on fertilisers should shift to DBT (the GoI has already started the process as announced in the Union Budget 2016–17), the benefits of which will be maximised, if all controls (including imports) on the fertiliser industry/outputs are lifted, simultaneously. In the case of P (phosphate) and K (potash) fertilizer subsidy, with the Nutrient Based Subsidy (NBS) scheme, a fixed amount of subsidy will be given on each grade based on their content. Certain ***improvements in fertilisation*** needed in the Indian farm sector may be summed up as follows:

(i) *Crop-responsive & balanced use of fertilisers:* There is need to facilitate the optimal use of fertilisers depending on the soil health and fertility status. Linking the *soil health card* to provide profile of the soil and fertilizer on the basis of the same profile utilizing fertilizer, (even if not subsidised) can improve the yield of crops.

(ii) *Micro nutrients & organic fertilisers:* Indian soils show deficiency of micro nutrients (like boron, zinc, copper and iron) in most parts of the country which limiting

44. Ministry of Finance, **Economic Survey 2015–16**, p. 107.

crop yields and productivity. Fertilisers which supplement micro nutrients can provide an additional yield in cereals in the range of 0.3 to 0.6 ton per hectare.[45] This deficiency can be overcome if there by expansion in the use of organic fertiliser. Besides, being cheaper to use organic composting and manure it can help improve and retain soil fertility, too., There is great scope for enhancing the use of organic fertilisers as around 67 per cent of Indian soil is characterised by low organic carbon.

(iii) *Nutrient Management:* To maintain soil health and productivity, judicious use of chemical fertilisers, bio-fertilisers and locally available organic manures like farmyard manure, compost, vermi-compost and green manure based on soil testing is necessary.

With over 12 crore farm holdings in India, it is a big challenge to provide soil-testing facilities for overcoming the multi-nutrient deficiencies in soils so as to improve agricultural output. Use of information technology and providing soil fertility maps to farmers can go a long way in efficient nutrient management.

(iv) *Regional disparity in fertilizer consumption:* India has wide regional disparities in the consumption of fertilizers. This may be attributed to the availability of irrigation facilities in the high consuming states (since irrigation is a requirement for proper absorption of fertilizers). It is necessary to reduce the disparities through appropriate soil-testing facilities and other policy measures.

45. As per the conducted by the *Indian Council of Agricultural Research (ICAR)* – quoted by the **Economic Survey 2015-16**, Vol. 2, p.108.

PESTICIDES

Due to the presence of weeds, pests, diseases and rodents, the crop yield losses range from 15 to 25 per cent in India. Even though pesticides are essential for improving crop yields, per hectare pesticide use is much lower in India in comparison with other countries. Presently, India uses a low amount of 0.5 kg per ha pesticide compared to 7.0 kg per ha in the USA, 2.5 kg per ha in Europe, 12 kg per ha in Japan and 6.6 kg per ha in Korea. Besides, there are certain concerns regarding pesticides use in the country –

(i) Use of pesticides without following proper guidelines,

(ii) Use of sub standard pesticides, and

(iii) Lack of awareness about pesticide use.

These practices have given rise to *pesticide residues* being found in food products in India, posing major threats to the environment and human beings. Some **policy steps** which may be suggested in this regard are:

(i) Farmers need to be educated about the classification of insecticides on the basis of their toxicity and their suitability for aerial application.

(ii) The CIBRC (Central Insecticide Board and Registration Committee) has issued guidelines for the application of pesticides, their dosage, minimum intervals to be maintained, and the levels of toxicity. This information needs to be widely disseminated among farmers.

(iii) Greater focus on IPM (Integrated Pest Management) which will encompass a judicious mix of pest control methods by leveraging the cultural, mechanical, biological methods and need-based use of chemical pesticides. It gives preference to the use of bio-pesticides and bio-control agents, too.

(iv) Being environment friendly, nontoxic and cost effective, bio-pesticides need to be promoted among small farmers to improve productivity in agriculture.

AGRI-CREDIT & FARMER'S SUICIDES

Agricredit is an important mediating input for agriculture to improve productivity. Access to institutional credit enables the farmer to enhance productivity by investing in machinery and purchase of variable inputs like fertilizers, quality seeds, and manure and providing funds till the farmer receives payment from sale of produce, which is at times delayed and staggered. Input use by farmers is sensitive to credit flows to the agriculture sector. Some of the concerns regarding agri-credit are as given below.

(i) Predominance of *informal sources* of credit: farmers still avail as much as 40 per cent of the funds from informal sources – 26 per cent of the total agricultural credit flow from the local money lenders (highly exploitative lenders).[46] In respect of high interest rates, **DBT** may be considered to replace subvention of interest rates. The intermediation and refinance model to promote agricultural credit needs to be revisited and replaced with DBT that shall subsidise the interest paid by the farmer, instead of subsidising refinance to financial institutions.

(ii) The ratio of agricultural credit to agricultural GDP has increased from 10 per cent in 1999–2000 to around 40 per cent by 2015–16. However, the share of long-term credit (for more than 5 years) in agriculture or investment credit has declined from 55 per cent in 2006–07 to 37 per cent in 2015–16. The decline in the share of long-term credit in agriculture needs to be arrested and reversed.

(iii) There is regional disparity in the distribution of agricultural credit. The coverage is very low in the north-eastern and eastern regions of the country.

(iv) Crop Loans being short-term (for less than 15 months) in nature are meant to meet the current expenditure till the crop is harvested fail to promote major investments in agriculture. Farm loans upto Rs. 3 lakh are disbursed at an interest rate of 7 per cent per annum (effective interest rate becomes 4 per cent after 3 per cent interest subvention). For the fiscal 2017-18, farm credit has been increased by the **Union Budget 2017-18** to Rs. 10 lakh crore (which was Rs. 9 lakh crore for the year 2016-17, as per the *Economic Survey 2016-17*).

FARMER'S SUICIDE

Bankruptcy and indebtedness have been cited as a major cause for farmer's suicides (around 37 per cent of all suicides by the farmers) in the country in which local money-lenders were usually portrayed as the villain. But as per the latest NCRB (National Crime Records Bureau) data, 80 per cent of the farmers who committed suicides in 2015 due to 'bankruptcy or debts' had borrowed money from institutional sources (banks and registered microfinance institutions). Besides, the country has seen a threefold increase in the famers' suicide due to bankruptcy and indebtedness (from 1163 of 2014 to 3097 in 2015). In 2015, a total of 8007 farmers committed suicides due to various reasons. It was for the *first time* that the NCRB categorised farmers' suicides due to debt or bankruptcy based on the source of loans.

Looking at the current scenario only the size of fund allocated by the government for agriculture credit does not look sufficient. India

46. **NSSO**, 70th Round data quoted by the **Economic Survey 2015-16**, Vol. 2, p. 110.

needs to strengthen other support systems also related to enhancing the farm income together with expanding the agriculture insurance in a speedy manner.

AGRICULTURE EXTENSION SERVICES

Another key input to farm sector is 'agriculture extension services (AES)'. These services can improve productivity by providing timely advisory services to farmers to adopt best practices, technology, meet with contingencies, market information etc. The AES (also called 'rural advisory services') has been defined[47] as "consisting of all the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organisational and management skills and practices so as to improve their livelihoods and well-being".

Though there are multiple agencies in India offering agricultural advisory services the system is not efficient enough due to the following reasons:[48]

(i) Lack of functional autonomy,

(ii) Rigid hierarchical structures leading to lack of innovative methods of providing extension services, and

(iii) Coordination failures at multiple levels.

For the improvement of the AES in the country the suggested policy steps are:[49]

(i) Implementing a new scheme or additional outlays in existing schemes.

(ii) Need of 'one-stop-shop' that offers both hardware and software solutions to raise the incomes of farmers, especially small and marginal farmers.

(iii) Need of an approach which is 'neutral to input, crop and region'.

(iv) Minimizing wastage in inputs as well as produce, till it leaves the farm gate.

(v) Efforts to enhance post harvest processing/ value added activities at the farm.

(vi) Need to share with the farmer, information on weather, in order to improve yield, and minimize damage to crops.

(vi) Promoting inter and rotational cropping and efficient utilization of the inputs.

(vii) Need to shift to demand-driven agricultural advisory services.

(viii) Need of a virtual connect, using IT (mobile and internet) and integration of agricultural extension services.

Over the time, the GoI has taken variety of initiatives[50] to strengthen the AES in the country, major ones being – *Kisan TV* set up; broadcasting of agri-information by AIR; *Agri-Clinic* & *Agri-Business* (by agriculture graduates); Extension education institutes set up; model training courses for horticulture, animal husbandry, etc started; National Centre for Management of Agricultural Extension (acronym for which is *MANAGE*) set up as an apex institute to train middle and senior level officers of the states/UTs.

PMFBY

The Government of India launched a new agricultural insurance scheme in January 2016. The new scheme[51]—Pradhan Mantri Fasal Bima Yojana (PMFBY)—has been termed as a *path breaking scheme for farmers' welfare.* The highlights of this scheme are as given below:

47. *GFRAS (Global Forum for Rural Advisory Services),* 2010 – quoted by the **Economic Survey 2015-16**, Vol. 2, p. 111.

48. NITI Aayog, **Task Force on Agriculture**, 2015.

49. Ministry of Finance, **Economic Survey 2015–16**, p. 112.

50. Ministry of Finance, **Economic Survey 2015–16,** Pulbication Division, **India 2016;** Ministry of Finance, **Economic Survey 2014–15.**

51. **Government of India**, N. Delhi, January 13th, 2016.

- There will be a uniform premium of only 2 per cent to be paid by farmers for all kharif crops and 1.5 per cent for all rabi crops.
- In case of annual commercial and horticultural crops, the premium to be paid by farmers will be only 5 per cent.
- The premium rates to be paid by farmers are very low and balance premium will be paid by the government to provide full insured amount to the farmers against crop loss on account of natural calamities.
- There is no upper limit on Government subsidy. Even if balance premium is 90 per cent, it will be borne by the Government.
- 25 per cent of the likely claim will be settled directly on farmers account and there will be one insurance company for the entire state as well as farm level assessment of loss for localised risks and post harvest loss.
- Earlier, there was a provision of *capping* the premium rate which resulted in low claims being paid to farmers. This capping was done to limit Government outgo on the premium subsidy. This capping has now been removed and farmers will get claim against full sum insured without any reduction.
- The use of technology will be encouraged to a great extent. Smartphones will be used to capture and upload data of crop cutting to reduce the delays in claim payment to farmers. Remote sensing will be used to reduce the number of crop cutting experiments.

The PMFBY replaced the existing[52] *NAIS (National Agricultural Insurance Scheme)* of 1999 and *Modified NAIS* of 2010–11. The scheme is being implemented by the private sector as well as the public sector (AICIL) agriculture insurance companies. The scheme is estimated to cover 50 per cent of the cropped area by 2018-19 (which was 30 per cent by 2016-17), as per the **Union Budget 2017-18**. Looking at the frequent droughts and floods, this scheme is seen as an important initiative from the government.

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.[53] 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;

52. Ministry of Finance, **Economic Survey 1990–2000** (New Delhi: Government of India, 2000); Ministry of Finance, **Economic Survey 2010-11** (New Delhi: Government of India, 2011).

53. ***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.

(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;

(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.

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 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[54] and the OECD[55]. According to the joint

54. 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 January. 1995***).

55. ***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 and South Korea). The first idea of 'globalisation' was proposed by the OECD in the early 1980s at one of its Annual Meet (***at Brussels***).

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.[56]

(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.[57]

(ii) The NCAER (National Council for Applied Economic Research) survey of the WTO on the Indian economy is cited as the best document in this area. The survey[58] 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 almost 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

56. Merchandise trade does not include services.

57. Ministry of Finance, Economic Survey 1994–95 (New Delhi: Government of India, 1995).

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

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 probably ***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[59]

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 relevant 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 failure of the organisation itself). We may take a look at the challenges before the Indian agriculture:

(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.[60]

(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[61] as the farmers will always be in favour of going for the crops and commodities which have comparative price advantage.

59. 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 and 2007. For better understanding of the readers only the consensual as well as the less-complex parts have been provided here.

60. 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.

61. 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.

(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.[62]

(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 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.[63]

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.

62. 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.

63. 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.

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 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 developing 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.[64]

WTO AND AGRICULTURAL SUBSIDIES[65]

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).[66] 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.

64. 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.

65. 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.

66. Defined in ***Article 1*** and ***Annexures 3 & 4,*** Agreement on Agriculture (AoA), WTO, 1994.

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'.[67]

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.[68] These include government policies of ***minimum support prices*** (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.[69] 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.[70] 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

67. WTO, ***Article 6.2, AoA***, 1994.
68. WTO, ***Article 6, AoA***, 1994.
69. WTO, ***Article 6***, ***Para 5*** AoA, 1994.
70. WTO, ***Annexure 2, AoA***, and ***Para 1*** AoA, 1994.

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.[71] 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.[72]

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 distortion as used by Annexure 2)— it is the view of the developing countries. These countries have raised their fingers on the direct payments[73] given by the developed countries to their farmers via programmes like income insurance and income-safety schemes,[74] environmental protection, 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.

71. WTO, ***Annexure 2, AoA***, AoA, 1994.
72. 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.
73. WTO, ***Para 5, Green Box, AoA,*** 1994.
74. WTO, ***Para 7, Green Box, AoA,*** 1994.

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)[75] 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.[76]

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

75. WTO, ***Para 8***, **Green Box,** ***AoA,*** 1994.
76. WTO, ***Article 6.2, AoA,*** 1994.

special and differential treatment in favour of developing countries.[77]

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 to the non-agricultural goods of the member countries.[78] 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.**

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**[79] 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.[80]

NATIONAL FOOD SECURITY ACT

The National Food Security Act was enacted by the Ministry of Consumer Affairs, Food and

77. WTO, ***Article 14, AoA,*** 1994.

78. 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.

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

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

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 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 Government of India 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)[81] has not grown with the pace which we see in the developed countries—there has been certain reasons for it:

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

(ii) 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.

(iii) 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.).

(iv) 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

81. The analyses are based on several volumes of ***Economic Survey, India*** and the relevant documents of the Government of India between the period 2005 and 2015.

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 and Regulations

Rules and regulations regarding the industry is as given below:

(i) 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.

(ii) For foreign investment, automatic approval is given even up to 100 per cent equity for a majority of processed foods.

(iii) 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, 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

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:

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

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

(iii) 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.

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.

DOUBLING FARM INCOME

Remunerative farming is not a precondition for enriching farm community only but it is considered the biggest incentive to enhance the agricultural output, too. This is why enhancing farm income has emerged among the most immediate policy concerns for the government in recent times. Recently, a shift has been seen in the Government's strategy towards the agriculture sector—from increasing farm output to increasing farm income. Aimed at *doubling the farmers' income by 2022*, the Government of India has announced a 'seven-point strategy'. The details of the strategy are as given below:

(i) Focus on irrigation with bigger budgets aimed at 'per drop, more crop'.

(ii) Provision of quality seeds and nutrients based on soil health.

(iii) Strengthening warehousing and cold chains to prevent post-harvest crop losses.

(iv) Promoting value addition through food processing.

(v) Creation of a national farm market, removing distortions and e-platform.

(vi) Mitigating risks at affordable cost through suitable kind of farm insurance.

(vii) Promoting ancillary activities like poultry, beekeeping and fisheries.

Agri-experts together with the foremost Indian agriculture scientist M.S. Swaminathan have appreciated this initiative of the Government. The challenge of doubling farmers' income within the prescribed time frame is very much possible supported by a good strategy, well-designed programmes, adequate resources and good governance.

WOMEN FARMERS

In sector agriculture, women play a significant and crucial role. Right from the main crop production to livestock, horticulture, post-harvest operations, agro and social forestry, fisheries and marketing, they are involved at every possible level of farm activity (this was rightly recognised by the National Commission on Women, 2001). For sustainable development of the agriculture and rural economy, the contribution of women to agriculture and food production cannot be ignored.

Globally, there is empirical evidence that women have a decisive role in ensuring 'food security' and 'preserving local agro-biodiversity'. Rural women are responsible for the integrated management and use of diverse natural resources to meet the daily household needs *(Food and Agriculture Organisation, 2011)*.

But in this sector also India has high *gender disparity*. As per the Census 2011, out of total female main workers, 55 per cent were agricultural labourers and 24 per cent were cultivators. However, only 12.8 per cent of the operational holdings were owned by women. Moreover, there is concentration of operational holdings (25.7 per cent) by women in the marginal and small holdings categories. With growing rural to urban migration by men, there is **feminisation** of agriculture sector in the country, with increasing number of women in multiple roles—as cultivators, entrepreneurs, and labourers.

This requires that women farmers should have enhanced access to resources like land, water, credit, technology and training which needs critical analysis in the context of India. In addition, the entitlements of women farmers will be the key to improve agriculture productivity. Towards this, Government has been implementing *various schemes* which help improve the entitlements of women farmers, which will prove to be advantageous in bridging the policy gaps which exist in the sector. The following measures[82] have

82. ***Economic Survey 2017-18***, Vol. 2, pp. 103-104, Ministry of Finance, Government of India, N. Delhi.

been taken to ensure mainstreaming of women in agriculture sector:

- Earmarking at least 30 per cent of the budget allocation for women beneficiaries in all ongoing schemes and programmes.
- Initiating women centric activities.
- Focus on women self-help group (SHG) by delivering micro-credit and right information together with involving them in the decision-making bodies.
- Recognising the critical role of women in agriculture, the Ministry of Agriculture and Farmers Welfare has declared 15th October of every year as *Women Farmer's Day*.

Indian farm sector needs a gender specific policy framework to adjust with the existing and emerging realities in the sector. Such a nuanced policy intervention will not only enhance food security but promote gender equality, extension services, sustainability and all-round development in the rural areas.

CLIMATE SMART AGRICULTURE

Climate change can impact the farm sector in different ways—increased variability in temperature, rainfall, extreme weather events like drought and flood. These incidences ultimately hit the farm community in a very negative way. To fight out these uncertainties development of a climate resilient agro-system is the need of the hour.

It is in this backdrop that the new concept of Climate Smart Agriculture (CSA) has emerged.[83] It is an approach that helps to guide actions needed "to transform and reorient agricultural systems to effectively support development and ensure food security under changing climate". It aims to provide stakeholders the means to identify agricultural strategies suitable to their local conditions. The CSA aims to tackle ***three*** main objectives—

(i) Sustainably increasing agricultural productivity and incomes;

(ii) Adapting and building resilience to climate change; and

(iii) Reducing and/or removing greenhouse gas emissions wherever possible.

Though, this new concept is at a nascent stage in India, the Government has already started taking policy initiatives in this direction. At present, *climate resilient technologies* are being demonstrated in 153 model villages under KVK (Kisan Vikas Kendra) covering 23 states under National Innovations on Climate Resilient Agriculture (NICRA). In addition, 623 contingency plans have been prepared to manage various weather aberrations such as droughts, floods, cyclones, hailstorms, heat and cold waves.

LOOKING AHEAD

Though the share of agriculture and allied sector in gross value added (GVA) is on decline, the latest **Economic Survey 2017-18** suggests that in the process of inclusive growth in the country, the sector will remain an *engine of broad based growth*. This will not only reduce inequalities and poverty but will also strengthen food security.

At present, the agriculture sector of the country is experiencing structural changes which are opening up new challenges and opportunities. The initiatives taken by the Government in this regard are multi-dimensional and oriented towards transforming the sector—

- Agricultural marketing
- Initiation of technology
- Adoption of Direct Benefit Transfer (DBT) mode for timely delivery of extension services, credit and other inputs to small and marginal farmers.

83. ***Economic Survey 2017-18***, Vol. 2, pp. 113-114, Ministry of Finance, GoI, N. Delhi.

- Push in favour of farm diversification so that risks to farm income can be reduced—by facilitating the development of agricultural sub-sectors like livestock and fisheries.

To *transform* agriculture and allied sector the *Economic Survey 2017-18* has suggested the Government to take appropriate policy actions in the following areas—

(i) Prices of the farm products should remain remunerative to the farmers.

(ii) Agricultural trade should be interlinked in such a way that the benefits of globalisation reaches the farmers.

(iii) Adoption of climate smart agriculture to secure the livelihood and income security of the farmers.

(iv) Need of increased focus on small, marginal and women farmers.

Aimed at making farming remunerative a major announcement, the **Union Budget 2018-19** did a major announcement—fixing the minimum support prices (MSP) of the crops 50 per cent above their production cost. Though, the methodology for the calculation of the production cost is yet to be made public by the Government. Experts take this policy initiative as a big boost to the farm sector. As around 85 per cent of farmers in the country don't have marketable surplus (as they are small farmers owning less than five acres of land), experts believe that 'input subsidies' will serve greater purpose in this regard. The delivery of input subsidies to the farm sector needs rationalisation and emphasis through the direct benefit transfer.