INTRODUCTION:

Agriculture remains the most important vector of the Indian economy. More than 50% of Indian depends upon agriculture for their livelihood.

Before starting any discussion on Indian agriculture, we must look into its salient features:

1. **Biggest Employment Provider:** From the livelihood point of view, still 50% of Indians depend up on agriculture sector. This makes it a more important sector than the industry and the services. It means that 50% of the population lives with only 13.9% of the total income of the country—this fact clearly substantiates the reason for why the Indian farmers are poor. In the developed economies such as the USA, France, Norway, the UK and Japan, agriculture contributes only 2% of their GDP with only 2% people dependent on this sector for their livelihood. This means that there is a gross asymmetry in the agricultural income and employment.

2. **Asymmetry in income generated and employment provided:** 50% Indians are dependent upon agricultural sector for their livelihood but they contribute only 15% of National Income. This explains that there is a great imbalance in the employment provided by agricultural sector and income generated.

3. **Falling Share in Economy:** 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. The share of agriculture sector in the economy remains at 14.1% of
the GDP. In the fiscal 1950-51 agriculture accounted for 55.4% in the GDP.

4. **Biggest Private Sector:** Agriculture is not only the biggest sector of the economy, but also the biggest private sector in the country. Moreover, it is the only tax-free profession in India.

5. **Biggest Unorganised Sector:** This is the biggest unorganized sector of the economy, accounting for more than 90% share in the total unorganized labour-force (i.e., 93 % of the total labour forces of the economy, i.e., 39.7crores are employed in the unorganized sector).

6. **High Exports and High Imports:** India is among 15 leading exporters of agricultural products in the world. As per the International Trade Statistics, India's agricultural exports constitutes 2% share of world trade in agriculture. It contributes 10% of total exports earnings of the country. On the other hand, India’s agricultural imports constitute a 1.2 % share of world trade in agriculture. With 1 % increase in the share of agriculture in India's total exports, the money which flows to the agriculture is calculated to be Rs. 8500 crores.

7. **Low Growth Rate:** The Growth rate of Indian agriculture sector is abysmally low compared to other sectors. The present growth rate in 2014-15 has been only 1.1%.

8. **Low Productivity:** Productivity of Indian farms is very low compared to that of developed countries. For example, average yield of Rice in India per hectare is about 2600 kgs, whereas in Japan it is more than 600 kgs, i.e., more than twice the productivity of Indian farms.
9. **Under-developed Irrigation facilities:** Only 40% of Indian farms are provided with irrigation facilities. Remaining 60% farms are dependent directly upon monsoon. This is the reason why it is said that Indian Agriculture is a gamble in the Monsoon.

Now, we will see the agricultural seasons in India. agricultural crop year in India is from July to June. The Indian cropping season is classified into three main seasons based upon Monsoon-

(i) **Kharif**
(ii) **Rabi**
(iii) **Zaid**

**Kharif:** Cropping season from July to October during the South-West/Summer Monsoon is known as Kharif. Majority of Indian agricultural activities are done in this season due to monsoon and its rainfall. Major crops like Rice, Cotton, Maize, Sorghum, Pearl millet/Bajra, finger millet/Ragi (cereals), Arhar (pulses), Soyabean, groundnut (oilseeds) and Jute are grown in this season.

**Rabi:** Cropping season from October to March months (North/East/Returning/Winter Monsoon) is known as Rabi. Major crops grown in this season are Wheat, Barley, Oats (cereals), chickpea/gram (pulses), linseed, mustard (oilseeds) etc.

**Zaid:** Cropping season between March and June is known as Zaid. Where there is availability of irrigation facilities, Zaid crops are
grown. Mainly vegetables, Watermelon, Rice are grown in this season.

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

**FOOD PHILOSOPHY OF INDIA**

Indian food philosophy 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 the independence. The main aim and the struggle of this phase was producing as much food grains as required by the Indian population i.e., achieving physical access to food. The idea of Green Revolution at the end of this phase at least gave India the confidence of realising the objective. At the end of 1980s, India was a self-sufficient country regarding food.

**The Second Phase**

Meanwhile India was celebrating its success of the first phase, a new challenge confronted India achieving economic access to food. The situation went on worsening and by early 2000 there was a paradoxical situation in the country when it was having more than three times buffer stocks of food grains 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

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 now). The courts took the governments on task if food grains rot either in godowns or destroyed in oceans to manage market price for the food grains, 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 the food. As the inputs of the Green Revolution were costlier, its output naturally was 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 the 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 the food grains (via the second green revolution based on the biotechnology). It m
kept in mind that the food self-sufficiency happiness was a temporary thing for India. By the mid 1990s, India realized that its food grain 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 1980s, world experts started questioning the very way world was carrying on with the 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. It was time to look back and introspect. By early 1990s, several countries started going for ecologically friendly methods and techniques of industrial, agricultural and services' sector 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 realized at the cost of the precious ecology and biodiversity—a new challenge! India needed a new kind of green revolution which could deliver it the physical, economic as well as ecological access to the food—the Second Green Revolution—an all-in-one approach towards the agriculture sector.
LAND REFORMS

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 the 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:

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.

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

The third objective of the land reforms in India was highly contemporary in nature which did not get enough sociopolitical attention—it was the objective of increasing agricultural production for solving the inter-related problems of poverty, malnutrition and food insecurity. To realize the objectives of the land reforms, the government took three main steps which had many internal sub-steps:

**Abolition of Intermediaries**

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

**Tenancy Reforms**

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

Regulation of rent so that a fixed and rational rate of rent could be paid by the sharecroppers to the land owners;
Security of tenure so that a share-cropper could be feel secure about his future income and his economic security; and

Ownership rights to tenants so that the landless masses (i.e. the tenants, the share-croppers) could be transferred the final rights for the land they plough - “land to the tillers”.

**Reorganization of Agriculture**

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

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

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.

Cooperative farming which has a high socioeconomic moral base was only used by the big farmers to save their lands from the draconian ceiling laws.

The whole attempt of land reforms in India is considered a big failure by the majority of experts. Many consider the issue of land reforms in India as the most complex socioeconomic problem of human history". The data regarding the numerical achievements of the land reforms have been highly discouraging'.

Tenancy reforms made tenants have their rights but only on 4% of the total operated area of India (14.4 million hectares of operated area by the 11 million tenants by 1992);

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

Taken together, the whole process of land reforms could benefit only 6% of the operated area of the country with a negligible socioeconomic positive impact.

It was the failure of the 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 the agricultural production thus the government opted the route of increasing the productivity to reach the same goal i.e., the initiation of the new techniques of agriculture.

**Reasons for Failure of Land Reforms**

Out of many reasons forwarded by the experts responsible for the failure of the land reforms in India, the following three could be considered the most important ones:

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

Lack of political will which was required to affect the land reforms and make it a successful programmed; and
The rampant corruption in public life, political hypocrisy and leadership failure in the Indian democratic system.

**Land Reforms & Green Revolution**

Once the Government launched the Green Revolution (GR), the issue of land reforms (LR) almost got marginalized due to the following reasons:

There is an inherent diabolic relationship between the GR and the LR as the former suits to bigger and economic land holdings the latter intended to fragment the land among a large number of the masses.

The LR was socially opposed by the landowning caste lobbies while there was no such opposition to the GR.

The level of legislative attempts taken by the governments regarding the LR till date had almost no positive socioeconomic impact on the country while the GR was having all potential of proving higher yields of the food grains.

The subsidized supplies of food grains 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.

International pressure as well as the suggestions from the World Bank besides the success stories of the GR from the countries where it had increased the yield of wheat.

**Land Reforms & Economic Reforms**

Once economic reforms started in early 1990s, the issue of the LR looks logically going to the back burner. Though many
governments have revived their new commitments to the matter of the LR, the market economy approach to reform hardly got materialized. The central government is doing everything to increase agricultural production, especially to achieve food security. Besides, unless India grows surplus agricultural produce the benefits of globalization in the WTO regime would not be accruing to the agriculture sector and the masses that depend on it for their livelihood would miss the train to their prosperity and development. The government’s emphasis and permission for corporate farming and contract farming has been praised by the experts in India and abroad alike. Yet, sociopolitical acceptance of these new methods of farming is yet to crystallize. Meanwhile, the soul of the land reforms needs modification to go parallel with the process of economic reforms.

**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. According to the results of Agriculture Census 1990-91:

The total number of operational holdings in the country had increased from 972 million in 1985-86 to 1066 million in 1985-86 to 1066 million in 1990-91.

Operated area, on the other hand, had risen only marginally, i.e., by about 0.6%. Rise in the number of holdings without corresponding increase in area clearly showed pressure of...
population on land with average size of holding declining from 1.69 hectare in 1985-86 to 1.55 hectare in 1990—91. 59 % of total operational holdings in 1990-91 were of size less than 1 hectare (i.e., marginal holdings), 32.2 % of size between 1-4 hectare (i.e., small holdings), 7.2 % of size between 4-10 hectares (i.e., medium holdings) and only 1.6 % of size more than 10 hectares (i.e., large holdings).

In 1985-86, Rajasthan had the highest average holding size of 4.34 hectares, followed by Punjab having an average size of 3.77 hectares. Contrary to it, Kerala was having the lowest average holding size of 0.36 hectares (1985-86 data are the latest.)

Agricultural holdings have been classified into three categories:

**Economic Holding**

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

**Family Holding**

Family holding is that holding which gives work to average size family having one plough under traditional farming system.

**Optimum Holding**

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

**Computerization of Land Records**

Two Centrally Sponsored Schemes viz. (i) Computerization of Land Records (CLR) and (ii) Strengthening of Revenue Administration
and Updating of Land Records (SRA & ULR) are being administered by Land reforms Division in the Department of Land Resources'. The Centrally Sponsored Scheme on Computerization of Land Records (CLR) was started in 1988-89 with 100 % financial assistance as a pilot project in eight districts, viz., Rangareddy (A.P.), Sonipur (Assam), Singhbhum (Jharkhand), Gandhinagar (Gujarat), Morena (M.P.), Wardha (Maharashtra), Mayurbhanj (Orissa) and Dungarpur (Rajasthan) with a view to remove the problems inherent in the manual systems of maintenance and updating of land records and to meet the requirements of various groups of users. It was decided that efforts should be made to computerise core data contained in land records, so as to assist development planning and to make records accessible to people/planners and administrators. At present, the scheme is being implemented in 582 districts of the country excepting those districts where there are no land records. A decision was taken during 1997-98 for operationalisation of the scheme at the tehsil/taluk level for facilitating delivery of computerized land records to users and public at large. Under this programmed, funds are released to the state governments for purchase of hardware, software and other peripheral equipment.

**GREEN REVOLUTION**

It is the introduction of new techniques of agriculture which became popular by the name of the Green Revolution (GR) around the world in early 1960s—at first for wheat and by the next decade for rice, too. It revolutionized the very traditional idea of food production by giving a boost by more than 250 % t
productivity level." The Green Revolution was centered around HYV of seeds developed by US scientist Norman Borlaug

**Components of GR:**

**The HYV Seeds**

They were popularly called the dwarf variety of seeds. With the help of repeated mutations, Mr. Borlaug had been able to develop a seed which was raised in its nature of nutrients supplied to the different parts of the wheat plant—against the leaves, stem and in favor of the grain. This made the plant dwarf and the grain heavier—resulting into high yield”. These seeds were non-photosynthetic, hence non-dependent on sun rays for targeted yields!

**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 composts because they have low concentration of nutrients content and required bigger area while sowing—it meant it will be shared by more than one seed! That is why a high concentration fertilizer was required which could be given to the targeted seed only—the only option was the chemical fertilizers—the urea (N), the phosphate (P) and the potash (K).

**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
least free of flooding and secondly, artificial water supply should be developed.'

**Chemical Pesticides and Germicides**

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

**Chemical Herbicides and Weedicides**

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

**Credit, Storage, Marketing/Distribution**

For farmers to be capable of using the new and the costlier inputs of the GR, 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 GR 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 infrastructures were developed by the countries going for the GR with softer loans coming from the World Bank—India being the biggest beneficiary.'
Impact of the Green Revolution

The GR had its positive as well as negative socioeconomic and ecological impacts on the countries around the world; we will specially study India here:

Socio-economic Impact

Food production increased in such a way (wheat in 1960s and rice, too 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 too.

But the discrepancy in farmers' income it brought with itself increased the inter-personal as well as inter-regional disparities/inequalities in India".

Rise in the incidence of malaria due to water-logging, a swing in the balanced cropping patterns in favor of wheat and rice putting pulses, oilseeds, maize, barley on the margins, etc. Were the negative impacts.

Ecological Impact

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

**Critical Ecological Crisis**

On the basis of on-field studies' it was found that critical ecological crises in the GR region are showing up—

*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.).

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

*Environmental degradation* due to excessive and uncontrolled use of chemical fertilizers, pesticides and herbicides has 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 sheep’s).

**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, uncontrolled use of chemical pesticides and weedicides and their industrial production combined together had polluted the land, water and air to such an alarmingly high level that the whole food chain had been a prey of high toxicity.
Conclusion

The above studies and the report were eye openers in the area of ecologically no 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' (ecofriendly) green revolution which is today known among the experts with many more names—the evergreen revolution, the second—green revolution the green farming.

MINIMUM SUPPORT PRICES (MSP)

The Government of India started announcing the Minimum Support Prices (MSP) in 1966-67 for wheat which was expanded to cover many more crops in the coming years in the wake of the Green Revolution which might have resulted into fall in prices of wheat depleting farmers' profit. It is a minimum price at which the government will purchase farmers' crops—whatever may be the market price for the crops.'

PROCUREMENT PRICES

Besides the minimum support prices (MSP) which was announced before sowing started, the government started announcing procurement prices (after the harvesting of the crops) at which it purchased the crops from the farmers. Procurement prices were announced higher than the MSP since the government was lagging behind when its food grain procurement required maintaining the buffer stocks. 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. Since
fiscal 1968-69 the government announced only the MSP which is considered the procurement price, too.

**ISSUE PRICE**

The price at which the food grains are allowed by the government to off take from the FCI this is the price at which the FCI sells its food grains. The FCI has been incurring huge losses in the form of food subsidies.' The government-procured food grains are stored temporarily in the concerned states of their purchase and then transported to their decided FCI godowns as part of the buffer stock. From here they head to the sale counters. The transportation, godowning, the cost of maintaining the FCI, grain losses make the food grains touch higher price that are never affordable by the masses. That is why the issue prices have never been market-based prices. The gap is considered as the element of the food subsidy in India

**BUFFER STOCK**

India has a policy of maintaining a minimum reserve of food grains (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 public distribution system (now TPDS) and at times goes to the open market to check the rising prices if needed.

**ECONOMIC COST OF FOODGRAINS**

The economic cost of food grains consists of three components, namely the MSP (and bonus if applicable) as the price paid to the farmers, procurement incidentals, and the cost of distribution. The economic cost for both wheat and rice witnessed signi
increase during the last few years due to increase in MSPs and proportionate increase in the incidentals between the period 2002-03 and 2010-11 per kg burden on wheat and rice has increased to Rs. 15 (from Rs. 9) and Rs. 20 (from Rs. 12), respectively.

**DECENTRALISED PROCUREMENT SCHEME**

The decentralized procurement scheme of the Government of India that is in operation since 1997 has evoked good response from the State Governments. Under this scheme, the designated States procure, store and also issue food grains under TPDS. The difference between the economic cost of the State Governments and the central issue price (CIP) is passed on to the State Governments as subsidy.

The decentralized system of procurement, helps to cover more farmers under the MSP operations, improves efficiency of the PDS, provides varieties of food grains more suitable to local taste, and reduces the transportation costs of the FCI.

**RISING FOOD SUBSIDY**

Provision of minimum nutritional support to the poor through subsidized food grains and ensuring price stability in different states are the twin objectives of the food security system. In fulfilling its obligation towards distributive justice, the government incurs food subsidy.

While the economic cost of wheat and rice has continuously gone up, the issue price has been kept unchanged since 1 July, 2002. The government, therefore, continues to provide large and growing amounts of subsidy on food grains for distribution under the
other nutrition-based welfare schemes, and open market operations.

The food subsidy expenditure has increased substantially in the past few years putting severe strain on the public exchequer from a total of Rs. 17,494 crores in 2001-02 it has gone to the level of Rs. 62,929 crores by 2010-11. The fiscal outgo is expected to be more once the proposed National Food Security Act is implemented.

**NATIONAL FOOD SECURITY ACT:**

The National Food Security Act was passed by the Parliament in 2012.

**Provisions of the Act:**

1. It is proposed to provide 7 kg. of food grains per person per month belonging to priority households at prices not exceeding Rs. 3 per kg of rice, Rs. 2 per kg of wheat, and Rs. 1 per kg of coarse grains and to general households not less than 3 kg of food grains per person per month at prices not exceeding 50 % of the MSP for wheat and coarse grains and derived MSP for rice.

2. It will benefit up to 75 % of rural population (with at least 46 % belonging to priority households) and up to 50 % of urban population (with at least 28 % belonging to priority households), besides providing nutritional support to women and children and meals to special groups such as destitute[extremely poor and lacking the means to provide for oneself] and homeless, emergency and disaster affected, and persons living in starvation. Pregnant and lactating w
will also be entitled to maternity benefit of Rs. 1,000 per month for six months.

3. In case of non-supply of food grains or meals, entitled persons will be provided food security allowance by the concerned state/ UT governments. Provisions for reforms in the TPDS such as doorstep delivery of food grains, application of information and communication technology (ICT) including end to end computerization, leveraging `adhere' for unique identification of beneficiaries have also been made in the Bill. Provisions have also been made for transparency and accountability including disclosure of records relating to the PDS, social audits, and setting up of vigilance committees besides an elaborate grievance redressed mechanism.

SUGAR SECTOR REFORMS

India is the largest consumer and second largest producer of sugar after Brazil. Sugar and Sugarcane are notified as essential commodities under the Essential Commodities Act 1955. The production of sugarcane during 2012-13 is estimated at 334.54 million tones. However, the Indian sugar sector suffers from policy inconsistency and unpredictability. The Sugar industry in India is over-regulated and prone to cyclicality due to price interventions.

Deregulation of the sugar industry has been widely debated for a long time. From a purely economic point of view, greater play of market forces would provide better prices and serve the interests of all stakeholders. The government should come into the picture only in situations where absolutely necessary. Export bans and controls
could be replaced with small variable external tariffs to stabilize prices.

A report on 'Regulation of the Sugar Sector in India: The way forward' has been submitted by the Committee under the chairmanship of Dr C. Rangarajan, Chairman of the Economic Advisory Council to the Prime Minister – the measures suggested are as follows -

Phasing out cane reservation area;

Dispensing with minimum distance criteria;

Dispensing with the levy sugar system;

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

Dispensing with the regulated release mechanism (of non-levy) sugar,

Stable trade policy;

No quantitative or movement restrictions on byproduct like molasses and ethanol and dispensing with compulsory jute pac
A stable, predictable, and consistent policy reforms to be brought about in a fiscally neutral manner and issues considered for implementation in a phased manner.

In the meanwhile, following on the path of ongoing factor market reforms' the Goo decontrolled the sugar industry in April 2013—effective for the `sugar year' September 2012-August 2013. It abolished the decades-old practice of regulating `how much sugar a mill can sell in the open market' and the 'levy' system in which a company is forced to sell 10 % of the output at a loss to the FCI for supplies through the PDS (Public Distribution System)—they will be no more under the levy obligation. The next move of reform may be 'linking sugar and sugarcane prices'. To continue subsidised supply to the poor, states will now have to buy sugar at market rates and maintain the existing PDS sale price of Rs 13.50 per kg, which has not been revised for a decade and is substantially lower than the average market price of Rs. 35 per kg.

EDIBLE OIL ECONOMY

India is one of the largest producers of oilseeds in the world. However, 50 % of its domestic requirements are today, met through imports, out of which crude palm oil and the RBD (Refined, Bleached and Deodorized) palmolein constitute about 77 % and soya bean oil constitutes about 12 %. The Economic Survey 2012-13 provides some valuable and timely advisory inputs on the 'edible oil sector' of India in the following way

Import dependence was about 3 % during 1992-93. The production of oilseeds, though it has increased in recent years (from 184.40...
lakh tons in 2000-01 to 297.99 laky tons in 2011-12), it has not kept pace with the demand for edible oils in India. Imports have helped raise the per capita availability of edible oils which has increased from 5.8 kg in 1992-93 increased to 14.5 kg in 2010-11.

One instrument for promoting future domestic production is calibration [mark (a gauge or instrument) with a standard scale of readings. @correlate the readings of (an instrument) with those of a standard. @adjust (experimental results) to take external factors into account or to allow comparison with other data] of the import duty structure. Large imports of edible oils are primarily due to competitive prices of edible oils in the international market and the import duty structure which has been sharply reduced to near zero levels over time to protect consumers -India has such a high market share (in the world edible oil imports) that allows it to set some independent tariff policy that can meet both goals better.

Considering the situation, it is time to frame a price band for edible oils in a manner that harmonizes the interests of domestic farmers, processors, and consumers through imposition of import duty at an appropriate rate.

The import duty would also generate revenue, which could also be utilized for an 'oilseeds development programmed'.

Recently the tariff value of all edible oils (which had remained unchanged since 2006) was updated to market levels. This is a right step for aligning the tariffs to current prices for edible oils in the international market. By freezing the tariff value, imports had
become more attractive than domestic refining. Over time, domestic oil palm production may also gain.

India is also fortunate in having a wide range of oilseed crops grown in its different agro-climatic zones, including high-value premium crops. Recently, export of edible oils in branded consumer packs up to 5 kg has been allowed without any quantitative limit having minimum export price (MEP) of US $ 1500 per ton in order to encourage export of high value premium edible oils. Farmers respond to prices. The aim of policy is to consistently enhance their competitiveness.

**AGRICULTURAL MARKETING**

The role of the agriculture market" is to deliver agricultural produce from the farmer to the consumer in the most efficient way. Agriculture markets are regulated in India through the APMC Acts. According to the provisions of the APMC Acts of the states, every APMC (Agricultural Produce Marketing Committee) is authorized to collect market fees from the buyers/ traders in the prescribed manner on the sale of notified agricultural produce. The relatively high incidence of commission charges on agricultural/horticultural produce renders their marketing cost high, which is an undesirable outcome. All this suggests that a single point market fee system is necessary for facilitating free movement of produce, bringing price stabilization, and reducing price differences between the producer and consumer market segments. Another point to be highlighted is that the cleaning, grading, and packaging of agricultural produce before sale by the farmers have not been popularized by these market committees on a sufficient scale. Nevertheless, there
been some achievements in leading states like Maharashtra, Karnataka, Andhra Pradesh and Gujarat since the Model APMC Act 2003 has been implemented in those states. Some state governments have granted licenses to the private sector for setting up of markets and direct purchase from the farmers in order to provide alternative marketing channels. There is considerable potential for agricultural markets to be competitive. As the APMC was created to protect the interests of farmers, it will be in the fitness of things to give farmers the choice of going to the APMC or not. In the light of this, the need is to pursue further reforms in the state APMC Acts.

**E-CHOUPAL**

The e-Choupal, the first private sector initiative by the private sector in agricultural marketing, is a business platform consisting of a set of organizational subsystems and interfaces connecting farmers to global markets. This common structure can be leveraged to procure/provide a host of products and services for the farmer as a producer as well as a consumer. The e-choupal business platform consists of three layers, each at different levels of geographic aggregation. Each of the three layers is characterised by three key elements: (a) The infrastructure (physical or organisational) through which transactions take place, (b) The entity (person or organisation) orchestrating the transactions, and (c) The geographical coverage of the layer. The first layer consists of the village-level kiosks[a small open-fronted hut or cubicle from which newspapers, refreshments, tickets, etc. are sold] with internet access (or e-Choupal), managed by an ITC-trained local f;
(called a Sanchalak) and within walking distance (1-5 kilometers) of each target farmer. The relatively sparse population density in rural India justified the location of one e-Choupal per cluster of five villages. The second layer consists of a bricks-and-mortar infrastructure (called hubs) managed by the traditional intermediary who has local knowledge/skills (called a Samyojak in his new India-2007 & India-2010 role) and within tractorable distance (25-30 kilometers) of the target farmer. The ITC chose to operate the platform on the following three business principles: (a) Free information and knowledge which ensures wider participation by the farmer. (b) Freedom of choice in transactions (farmers, after accessing information at the e-Choupal, are free to transact their own way). (c) Transaction-based income stream for the Sanchalak by tying his revenue stream to the transaction (on a commission basis).

TRIFED

The Government established TRIFED (Tribal Co-operative Marketing Development Federation of India Ltd.) in August 1987. The basic aim of TRIFED was to save tribals from exploitation by private traders and to offer them remunerative prices for their minor forest produce and surplus agriculture products. TRIFED started functioning in April 1988. TRIFED has also been declared an important agency for collecting, processing, storing and developing oil seeds products. TRIFED plays the role of an agent of FCI for Government purchase of wheat and rice. It is also an agent of agriculture and cooperation.
department of Government for purchase of cereals, pulses and oilseeds.

Agriculture Ministry gives aid to TRIFED for compensation loss incurred due to price fluctuations.

**NAFED**

(National Agricultural Co-operative Marketing Federation of India Ltd.) has been established in co-operative sector at national level for marketing of agriculture products.

**STORING FACILITIES FOR AGRICULTURE PRODUCTS**

To promote storing facilities for agriculture products, National Co-operative Development & Warehousing Board (1956) and Central Warehousing Corporation (1957) were established. State Warehousing Corporations were also established. Presently FCI has its own warehouses.

**AGRICULTURAL CREDIT**

Three types' of loans are provided to Indian farmers to meet their financial requirements— (a) Short term loans (b) Medium term loans (c) Long term loans

Short term loans are provided for a period of less than 15 months to meet out expenses of routine farming and domestic consumptions. This type of loan is demanded by farmers for purchasing seeds, fertilizers and for meeting out family requirements.
Medium term loans are provided for a period of 15 months to 5 years to purchase agricultural equipment, animals and for land improvements.

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

Source of Loans

The Indian farmer can acquire the above types of loans from two sources: (a) Non-institutional sources like moneylenders, landlords, big businessmen, etc. (b) Institutional sources like commercial Banks, Co-operative Banks and Government sources.

Policy on agriculture credit aims at progressive institutionalization of credit agencies for providing credit to farmers for raising agricultural production and productivity. Agricultural credit is disbursed through a multiagency network consisting of Co-operatives, Commercial Banks and Regional Rural Banks (RRBs).

COMMODITY FUTURES MARKET

The commodity futures market facilitates the price discovery process and provides a platform for price risk management in commodities. Currently, 113 commodities are notified for futures trading of which 50 are actively traded in five national and 16 commodity specific exchanges. Agricultural commodities, bullion, energy, and base metal products account for a large share of the commodities traded in the commodity futures market. The total value of trade in the commodity futures market rose significan
2011 compared to that of the previous year due to increased awareness, the advent of new commodity exchanges, increase in global commodity prices, and improved regulation. To strengthen and broaden base the market, the Forward Markets Commission (FMC), which is the regulator for commodity futures trading under the provisions of the Forward Contracts (Regulation) Act 1952, has taken many initiatives:

Conducted awareness programmes during 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;

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

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

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 regulatory regime;

bringing out a guidance manual for improving audit practices, prescribing penalty structure for client code modification and for executing trade; and granting exemptions for short hedge for soyabean/oil futures, issuing directives for segregation of client accounts.
A recent study, undertaken by the Central Institute of Post-Harvest Engineering and Technology (CIPHET), a government-run institute, has estimated the value of farm waste in India at Rs 44,000 crore (at the prices of 2009), that is around 7% of the total produce which is much lower than the oft-stated 40% 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% of the total produce.

Attending the causes of storage and processing facilities, something the GoI is emphasizing, 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 food grains 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 would figure would be much higher. The GoI has said that availability of better technology and their adoption has brought about a reduction in losses.

IRRIGATION

The Planning Commission classifies irrigation projects/schemes in India on the following lines:

Major Irrigation Schemes — Those with cultivable command areas (CCA) more than 10,000 hectares
Medium Irrigation Schemes — Those with cultivable command areas (CCA) between 2,000 and 10,000 hectares

Minor Irrigation Schemes — Those with cultivable command area (CCA) up to 2,000 hectares.

Expansion of irrigation facilities, along with consolidation of the existing systems, has been the main part of the strategy for increasing production of food grains. 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 Accelerated Irrigation Benefits Programme (AIBP) in 1996—97.

The Accelerated Irrigation Benefit Programme (AIBP) was launched during 1996-97 to give loan assistance to the States to help them complete some of the incomplete major/medium irrigation projects which were in an advanced stage of completion.

NATIONAL FOOD SECURITY MISSION (NFSM)

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

- seeds of improved variety
- soil ameliorants
- plant nutrients
- farm machines/implements, and
- plant protection measures
In addition, a special initiative under the name of the Accelerated Pulses Production Programme was initiated in 2010 to boost the production of pulses by active promotion of technologies in 1,000 clusters of 1,000 ha (hectare) each.

Considerable achievements under the NFSM have been recorded during the course of implementation of the programme such as new farm practices, distribution of seeds of high yielding varieties of rice, wheat, pulses, and hybrid rice, and treating area with soil ameliorants to restore soil fertility for higher productivity. Through targeted interventions, the mission has already achieved, a year in advance, 25 millions tonnes of additional production of food grains exceeding the target of 20 million tonnes of production set for the terminal year 2011-12, of the 11th Plan. The MMA was revised in 2008 to improve its efficacy in supplementing/complementing the efforts of the states towards enhancement of agricultural production and productivity. It also provides opportunity to draw upon agricultural development programmes out of ten sub-schemes relating to crop production and natural resource management, and give it the flexibility to use 20 % of resources for innovative components. The revised MMA scheme has formula-based allocation criteria and provides assistance in the form of grants: loan to the states/UTs on 90:10 ratio basis, except in case of the north-eastern states where the central share is 100 % grant.

**RASHTRIYA KRISHI VIKAS YOJANA (RKVY)**

The RKVY was launched in 2007-08 for incentivising states to enhance public investment to achieve 4 % growth rate in agriculture and allied sectors during the 11th Plan. The
format permits taking up national priorities as sub-schemes, allowing the states flexibility in project selection and implementation. The sub-schemes include—

- Bringing Green Revolution to Eastern Region;
- Integrated Development of 60,000 Pulses Villages in Rainfed Areas;
- Promotion of Oil Palm;
- Initiative on Vegetable Clusters;
- Nutri-cereals;
- National Mission for Protein Supplements;
- Accelerated Fodder Development Programme;
- Rainfed Area Development Programme; and
- Saffron Mission.

The RKVY links 50% of central assistance to those states that have stepped up percentage of State Plan expenditure on agriculture and allied sectors.

**ISOPOM**

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

**NATIONAL HORTICULTURE MISSION (NHM)**
The horticulture sector includes a wide range of crops, such as fruits, vegetables, roots and tuber crops, flowers, aromatic and medicinal plants, spices, and plantation crops, which facilitate diversification in agriculture. It has been recognised that growing horticulture crops is now an ideal option to improve livelihood security, enhance employment generation, attain food and nutritional security, and increase income through value addition. Over the years, there have been noticeable achievements and significant improvement in the production and productivity of various horticulture crops. The NHM scheme was launched during the Tenth Plan for holistic development of the horticulture sector, duly ensuring forward and backward linkages by adopting a cluster approach, with the active participation of all the stakeholders. The supply of quality planting material through establishment of nurseries and tissue culture units, production and productivity improvement programmes through area expansion and rejuvenation, technology promotion, technology dissemination, human resource development, creation of infrastructure for post-harvest management and marketing in consonance with the comparative advantages of each state/region and their diverse agro-climatic conditions are the major programmes of the Mission. A major initiative has been taken during 2011-12 for enhancing the supply of good quality vegetables to metro cities under the Vegetable Initiative in Urban Clusters (VIUC).

NATIONAL BAMBOO MISSION (NBM)
The NBM, a centrally sponsored scheme of the Ministry of Agriculture for harnessing the potential of the bamboo crop in the country, is under implementation in 27 states. It envisages promoting holistic growth of the bamboo sector by adopting an area-based, regionally differentiated strategy to increase the area under bamboo cultivation and marketing. Under the Mission, steps have been taken to increase the availability of quality planting material by supporting the setting up of new nurseries/tissue culture units and strengthening existing ones. To address forward integration, the Mission is taking steps to strengthen marketing of bamboo products, especially those of handicraft items. Besides, the Mission has provided financial assistance to different institutions/universities for twenty-three R&D projects aimed at higher productivity of bamboo. Agro-forestry trials comprising bamboo grown along with agricultural/horticultural crops and medicinal plants under different agro-climatic conditions in various states have been initiated.

**NATIONAL AGRICULTURAL POLICY, 2000**

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

- 4% growth rate p.a. for the next two decades
- 4% growth rate p.a. target to be achieved by 2005.
- Land reforms to provide land to poor farmers.
Consolidation of holding in all states of the nation
- Promoting private investments in agriculture.
- To provide insurance umbrella for crops to farmers.
- To promote bio-technology.
- Promoting research for developing new varieties and ensuring protection to the developed varieties.

EXTENSION SERVICES

The Support to State Extension Programmes for Extension Reforms Scheme was launched in 2005-06, aiming at making the extension system farmer driven as well as accountable to farmers by providing for new institutional arrangements for technology dissemination. This has been done through setting up of Agricultural Technology Management Agencies (ATMA) at district level to operationalise the extension reforms. The ATMA has active participation of farmers/farmer groups, nongovernment organisations (NGOs) and other stakeholders operating at district level and below. Gender concerns are being mainstreamed by mandating that 30 per cent of resources on programmes and activities are utilised by women farmers and women extension functionaries. Certain other schemes' which support agriculture sector are:

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

Kisan Call Centres (KCC) to provide agricultural information to the farming community through toll free telephone lines;
Agri-clinic and agribusiness centres by agriculture graduates to provide extension services to farmers on payment basis through setting up of economically viable self—employment ventures, and information dissemination through agri fairs;

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

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

MANAGE, Hyderabad, an apex Institute at the national level, provides training to middle and senior level officers of agriculture and allied departments of the states/UTs

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". The Economic Survey 2011-12 discusses the Impacts of Climate Change on Indian Agriculture in the following points:
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.

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. Potential adaptation strategies to deal with the adverse impacts of climate change are

- Developing cultivars tolerant to heat, moisture, and salinity stresses;
- Modifying crop management practices;
- Improving water management;
- Adopting new farm practices such as resource-conserving technologies;
- Crop diversification; improving pest management;
- Making available timely weather-based advisories;
- 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, multiinstitutional 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 vuln
districts. State-of-the-art infrastructure is being set up at key research institutes to undertake frontier research on climate change adaptation and mitigation.

**SECOND GREEN REVOLUTION**

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

- replacing chemical fertilisers by bio-fertilisers;
- in place of chemical pesticides using bio-pesticides;
- conserving water, balanced cropping pattern, proper crop combinations, etc;

Such agricultural practices are popular in developed economies as organic farming."

**Second Green Revolution in India**

The Second Green Revolution in India is a concept as well as the name of a programme. It was suggested as an idea of sustainable agriculture in mid-1990s by the agro-scientists as the ongoing GR was not based on sustainable agricultural practices. When the Indian President, Dr. Kalam suggested for the same he attached much wider meaning to it. For him it consisted, crop management, cost reduction, value addition, processing and marketing other than the green farming. In January 2004, the Government of India announced a major agricultural programme named as the Second Green Revolution with an initial fund allocation of '50,000 crone. This programme was so exhaustive that it had hardly left any problem area of Indian agriculture untouched and had
potential of solving all long-standing problems. In a sense it was a complete agricultural policy based on the concept of sustainable development and well-equipped to fight the challenges posed by the WTO and capable enough to make Indian agriculture to emerge as a winner in the globalising economy. As there was a government change at the centre, the complete details of the programme were not made available. The present government at the centre has not been referring to this programme but in practice it looks like promoting the same causes more vigorously. In the meantime the President has been quoting the need for a second green revolution time and again.

**Summing up the Second Green Revolution**

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

**Increasing Agricultural Production: It includes four major things—**

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

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

- Initiation of sustainable practices in agriculture are all instrumental factors of sustainable agriculture to be utilised.

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

**Value Addition:** Indian agriculture has been lacking the aspect of value addition. In Indian agriculture sector right from farmers to the traders there has been a tendency of depositing agricultural goods in its primary form. That is why the real potential of Indian agriculture to create gainful employment has never been tapped. This green revolution tries to go for it in a big way. In this direction there will be an increased emphasis upon agro-processing, beverages and drinks industries.
Strengthening the Infrastructural/ Institutional Aspects: The last coordinate of the Second Green Revolution is related to the aspects of timely and adequate infrastructural/institutional support without which it cannot happen:

We need to strengthen the credit delivery aspects for the agriculture sector—both at micro level and at macro level (for corporate farming).

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

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

The development of telecommunication with all modern means are necessary preconditions for the timely development of agriculture sector and for the empowerment of the farmer.

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

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

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

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

"The SGR is capable of solving the whole gamut of problems related to Indian food philosophy."
"The SGR will give agriculture & rural development the due it deserves."

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

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

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

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

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

**Impact of Second Green Revolution**

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

As agricultural production will increase, India will be safe from food security concern. This will provide India physical access to food.
Every Indian will have economic access to food because of increase in production and cost cut due to genetically modified foods (GMFs) will make food cheaper.

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

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

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

It will eliminate hunger and malnutrition from India.

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

Living standard of the population will improve and development has to show up.

Thus India's rank on the human development index (HDI) will improve for sure. Other than the above-given points, there will be numerous related positive effects on the economy as a whole and on the agriculture sector in particular.

**Second Green Revolution Strategy in India:**
The urgent need for taking agriculture to a higher trajectory of 4% annual growth can be met only with improvement in the scale as well as quality of agricultural reforms undertaken by the various States and agencies at the various levels. These reforms must aim at efficient use of resources and conservation of soil, water and ecology on a sustainable basis, and in a holistic framework. Such a holistic framework must incorporate financing of rural infrastructure such as water, roads and power. The approach paper to the Eleventh Five Year plan has highlighted such a holistic framework and suggested the following strategies to raise agricultural output:

- Doubling the rate of growth of irrigated area;
- Improving water management, rain water harvesting and watershed development;
- Reclaiming degraded land and focusing on soil quality;
- Bridging the knowledge gap through effective extension;
- Diversifying into high value outputs, fruits, vegetables, flowers, herbs and spices, medicinal plants, bamboo, biodiesel, but with adequate measures to ensure food security;
- Promoting animal husbandry and fishery;
- Providing easy access to credit at affordable rates;
- Improving the incentive structure and functioning of markets; and
- Refocusing on land reforms issues.

National Commission on Farmers has already laid the foundation for such a framework. Programme formulation as well as their implementation in the States must be based on unique re
contexts incorporating agroclimatic conditions; and availability of appropriate research and development (R&D) backed by timely and adequate extension and finance.

**Second Push to Agriculture**

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

**WTO AND THE INDIAN AGRICULTURE: PROSPECTS AND CHALLENGES**

With the operationalisation of the provisions of the World Trade Organisation (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 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 the 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 Organisation! Yes, the process of converting the sector into industry has already started in most of the leading developing economies amidst tough resistance from the farmers, political parties and the NGOs (non-government organisations) 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' and the OECD'. According to the joint document, the WTO provisions were supposed to have the following positive impacts on the world trade:

By 2005 there will be an addition of $745 billion in the world merchandise trade."
The GATT Secretariat provided a full break-up of the above-projected trade increase in the following way:

The clothing sector to have a share of 60%.

The agricultural, forestry and fisheries products to have a share of 20%.

The processed food, beverages and drinks to have a share of 19%.

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:

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% to 1.0%, 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.

The NCAER (National Council for Applied Economic Research) survey of the WTO on the Indian economy is cited as
document in this area. The survey" had all important things to say on this issue:

The exports of agricultural products will be boosted by the WTO accepted regime

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

The survey also pointed out that almost 80-90 % 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.

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 far better than India is this matter.

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

Lastly, the survey ended at a high note of caution and concern that if India fails in its preparations to make agriculture come out as a winner in the WTO regime the economy will emerge as the biggest importer of the 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.
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 fulfill the agri-goods demands of India by 2025 AD. It means, it is only India which can meet its own agrigoods demand in the future.

There is no doubt in it 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**

If the WTO brings high prospects for the Indian agriculture, it also brings in some hardboiled 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 the 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:

**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 upo
world market for its food supplies marring its achievement of food self-sufficiency. This will have serious political and ethical outcomes for India'.

**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 the agri-goods in India. It would be very tough fighting dumping of the surplus agri-goods from other countries.

**Cropping Pattern:** The cropping pattern of agriculture might take a very unbalanced shape which will be highly detrimental to the ecology at large"as the farmers will be always in favour of going for the crops and commodities which have comparative price advantage.

**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 able to purchase the agri-goods having no price stability. It means:
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'.

WTO Commitments: There are certain time-bound obligatory commitments of India towards the provisions of 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% 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 pose a threat to the sovereign decision of need to be increased. (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'. None of the above-given challenges are easy to fight. These are not to be fought by India only 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

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 policy and the trade policy 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
member countries to impose higher tariff or tariff itself to ward off cheaper agri-goods from entering the economy—this is the main reason behind the above challenges. It means it is essential to modify, change or revise the provisions of the WTO.

Similarly, the issue of agricultural subsidies (the Boxes) need to be equitably defined so that they do not look biased. Here also the provisions of the WTO need revision. To fight out this typical challenge experts suggested that the WTO is not God-given. Its provisions may go in for change if concerted efforts are made by the member countries in this direction. Like-minded nations who face the same kind of crises should come together and go for a joint effort, from inside the WTO, for the revisions or relaxations in its provisions. Morality related and ethical issues might be used as eye-openers and a handy tool to have the attention of the developed nations and the WTO alike. Prima facie this suggestion looked as a preach easier said than done. But post-1995 times 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
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 meets and deliberations on their alternatives of bargaining power.

The second level suggestion to India was in the area of its preparedness for the WTO regime. India was required to set new and internationally best standards in the area of production by boosting the 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.

WTO AND AGRICULTURAL SUBSIDIES

Below are some types:

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). 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, fertilisers, irrigation and power will cut the production
of farming and will give undue advantage to such countries in their access to 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% and 10% of their total agricultural output in the case of developed and developing countries, respectively.

The Boxes

The agricultural subsidies, in the WTO terminology have in general been identified by ‘boxes’ which have been given the colours of the traffic lights green (means permitted), amber (means slow down i.e. to be reduced) and red (means forbidden). In the agriculture sector, as usual, things are more complicated. The WTO provisions on agriculture has nothing like red box subsidies, although subsidies exceeding the reduction commitment levels is prohibited in the ‘amber box’. The ‘blue box’ subsidies are tied to programmes that limit the level of production. There is also a provision of some exemptions for the developing countries sometimes called the ‘S & D box’.

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. 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, fertilisers, pesticides, irrigation, etc).

Under the WTO provisions, these subsidies are subject to reduction commitment to their minimum level—to 5% and 10% 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 blue box 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. 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 the blue box subsidies. In the current negotiations, some countries want to keep blue box as it is because they see it as a crucial means of moving away from distorting the amber box subsidies without causing too much hardship. C
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.' They must not involve price support. This box basically includes all forms of government expenses which are not targeted at a particular product and all direct income support programmes to farmers which are not related to current levels of production or prices. This is a very wide box and includes all government subsidies like—public storage for food security, pest and disease control, research and extension, and some direct payments to farmers that do not stimulate production like restructuring of agriculture, environmental protection, regional development, crop and income insurance, etc. The green box subsidies are allowed without limits provided they comply with the policy specific criteria." 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". In the current negotiations, some countries argue that some of the subsidies forwarded under this box (by the developed economies) do serious distortion to trade (opposed to the view of minimal distortion as used by the Annexure 2) it is the view of the developing countries. These countries have raised their fingers on the direct payments' given by the developed countries to their farmers via programme:
income insurance and income-safety schemes, 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.

**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 S & D Box. The Social and Development Box (S & D Box) allows the developing countries for some subsidies to the agriculture sector under certain conditions. These conditions revolve around human development Issues such as poverty, minimum social welfare, health support etc., specially for the segment of population living below the poverty line. Developing countries can forward such subsidies to the extent of less than 5% of their total agricultural output."

**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
be highly price distorting against the agri-exports of the developing countries. It is therefore opposed by the developing countries.

**Sanitary and Phytosanitary Measures**

The provisions of the WTO allow member countries to set their own health and safety standards provided they are justified on scientific grounds and do not result in arbitrary or unjustified barrier to trade. The provisions encourage use of international standards and also include certain special and differential treatment in favour of the developing countries." Though this provision has realised the scope of unjustified kind of health and phytosanitary 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 the 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.