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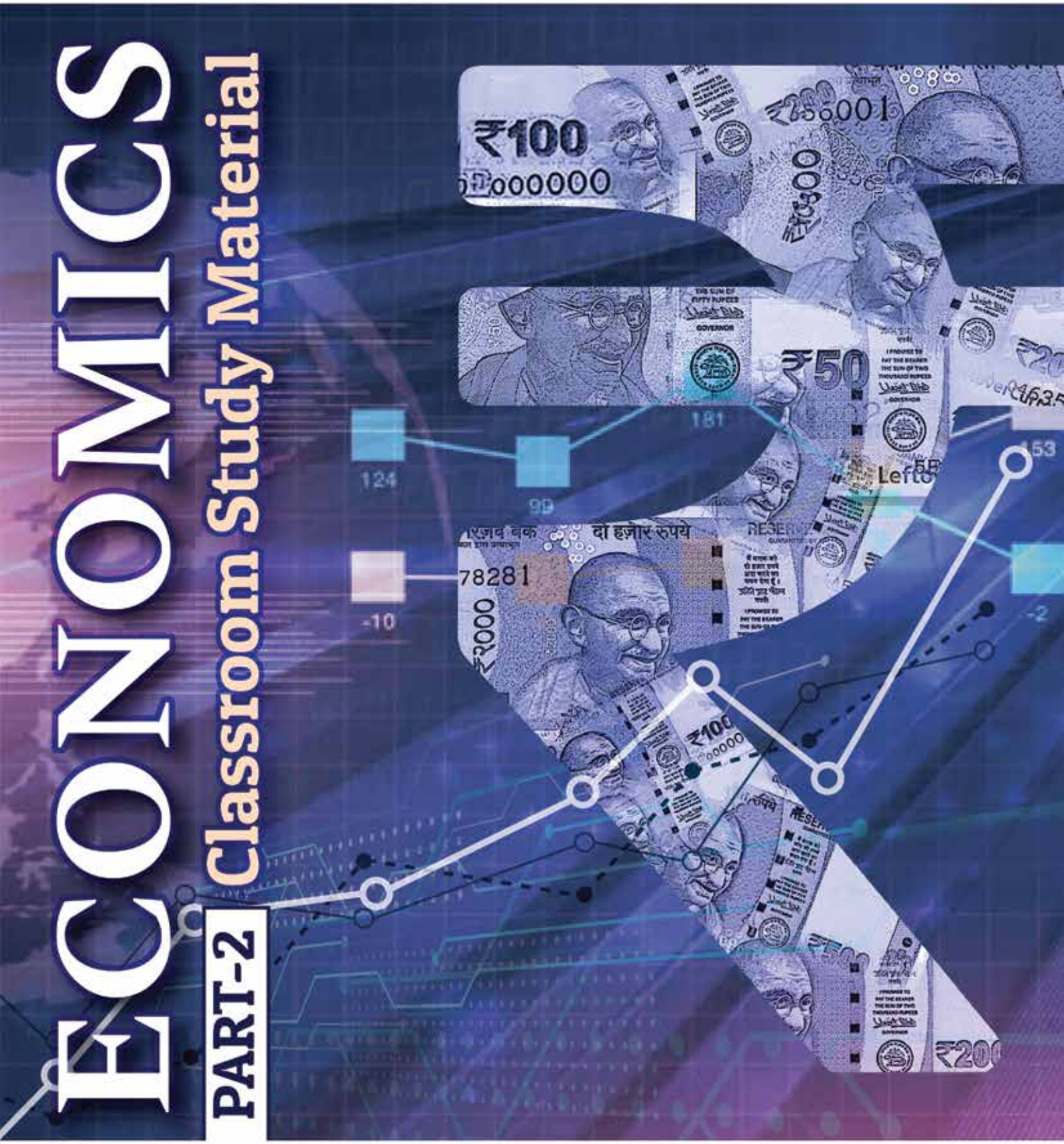
PART-2



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ECONOMY PART 2

Student Notes:

AGRICULTURAL SUBSIDIES AND MINIMUM SUPPORT PRICE

Contents

Student Notes:

1. Introduction

The Indian Government plays a vital role in agriculture sector development. The government's role is diverse and varied including, but not limited to, self-sufficiency, employment creation, support to small-scale producers for adopting modern technologies and inputs, reduction of price instability and improvement of the income of farm households.

This vital role can take a number of forms such as import-export policies and domestic policies like price support programmes, direct payments, and input subsidies to influence the cost and availability of farm inputs like credit, fertilizers, seeds, irrigation water, etc. Of all the domestic support instruments in agriculture, input subsidies and product price support are the most common.

> *Derived from the Latin word 'subsidium', a subsidy literally implies coming to assistance from behind. A subsidy, often viewed as the converse of a tax, is an instrument of fiscal policy.*

Subsidies may be direct or indirect, cash or kind, general or particular, budgetary or non budgetary, etc. However, their impact is practically visible on both the production and distribution. The **economic rationale** of subsidies lies in incentivising the producers to invest in productive activities and increase production leading to high growth in national income and obtaining desirable structure of production. A subsidy is a powerful fiscal instrument, besides taxes and others, by which the objective of growth and social justice may be achieved. It may serve as a necessary production accelerating catalyst for such interventions, which are socially desirable but whose adoption requires huge capital and risk.

Similarly, the social justification of subsidies lies in reducing inter-personal income inequalities and inter- regional development imbalances. Subsidies help manipulate or balance growth rates of production and trade across various sectors and regions, and for equitable distribution of income for protecting the weaker sections of the society. These are essentially negative taxes, skewed towards transfer resources in favour of those who receive them.

2. Agriculture Subsidies

An agriculture subsidy is a governmental financial support paid to farmers and agribusinesses to supplement their income, manage the supply of agricultural commodities, and influence the cost and supply of such commodities.

Agriculture subsidies act as an incentive to promote agricultural development and as an instrument of stimulating agricultural production and attaining self-sufficiency. In order to attain the goal of self-sufficiency in food, government adopts short term policies such as support prices of products and input subsidy to stimulate the products to increase the food production. It is expected that subsidies contribute to better cropping pattern, employment and income of the beneficiaries.

But in most development programmes, subsidies are one among the many developmental inputs being provided. Thus the observable changes in cropping pattern, employment level and overall incomes are because of the joint effect of all the efforts going on. Therefore, these changes cannot be attributed solely to subsidies.

2.1. Types of Agriculture Subsidies in India

2.1.1. Explicit Input Subsidies

Explicit input subsidies are payments made to the farmers to meet a part of the cost of an input. These are explicit payments made to the farmer. For example, subsidy on improved or high yielding variety seeds, plant protection chemicals and equipments, improved agricultural implements and supply of mini-kits containing seeds, fertilizers and plant protection chemicals

for certain crops are the explicit subsidies. These are usually made available to small and marginal farmers and those belonging to scheduled castes and tribes. The objective of such subsidies is to induce the farmers to adopt yield increasing inputs so that they are able to realize the benefits of new technology.

2.1.2. Implicit Input Subsidies

While there is transparency in explicit input subsidies, implicit input subsidies are hidden in nature. Implicit input subsidies emerge from the mechanics of pricing of inputs themselves. If inputs whose prices are administratively determined are priced low as compared to their economic cost, it becomes a case of implicit subsidization. As far as the farmer is concerned, he does not receive any direct payment but somebody in the economy accounts for the difference.

2.1.3. Output Subsidies

If by employing a restrictive trade policy, product prices in the domestic market are maintained at levels higher than those that would have prevailed in the absence of restrictions on trade, it becomes a case of subsidization of agricultural sector through output pricing. Conversely, if trade policies are such that result in lowering of domestic prices than the corresponding border reference price, it can be said that the policies have taxed the agricultural sector. (*The border reference price is the free on board prices in the case of exportables and cost, insurance and freight price in the case of importables.*)

2.1.4. Food Subsidies

The Indian government follows a twin policy of "providing market support to the foodgrain producers and supplying at least a part of the requirement to consumers at reasonable prices", and a policy of "maintaining a buffer- stock of required quantity for national food security". This policy paradigm involves a cost in the form of meeting the difference between the economic cost and issue prices of foodgrains. This is what is called the food subsidy and appears explicitly in the Union Budget.

2.2. Types of Agriculture Subsidies on the basis of Mode of Payment

2.2.1. Direct Subsidies

Direct subsidies are money transfers by the government that reach the ultimate beneficiary through a formal predetermined route. In agriculture and allied sectors, subsidies are given for crop husbandry, agricultural implements, minor irrigation, soil conservation, horticulture, animal husbandry, pisciculture, sericulture and also for loss in agriculture during natural calamities like droughts or floods. The various subsidy schemes in agriculture and allied sectors are routed through the departments of Agriculture, Horticulture, Animal Husbandry and Fisheries.

Advantages of deploying Direct Subsidies

- Direct subsidies provide purchasing capacity to the farmer and have a multiplier effect in terms of farmers investing in agriculture and raising their standard of living.
- These subsidies help in proper identification of beneficiaries thereby reducing pilferage and corruption etc.
- These increase efficiency, as well as promote regional balance, and crop diversification.
- These schemes impart a sense of agency to the beneficiaries which was otherwise absent from Indian policymaking. People can decide for themselves which crop they would want to grow, according to the profits and their local requirements. They can also use the amount in value addition, mixed farming and other beneficial activities for their farms/lands.
- Direct subsidies are more likely to control inflation and decrease prices of fertiliser, and other agricultural produce as well. It is because direct subsidies like cash transfer bring in

greater transparency and efficiency. This leads to both demand and supply responding more quickly to price signals, diminishing the distortions that keep inflation high.
- These induce behavioural changes, as farmers will stop using excessive water or fertiliser in their fields.
- These also ensure better nutrition as cereal centric food policy (Calorie based intervention) ignores micro-nutrients requirement of human body.

Disadvantages of Direct Subsidies

- There is a good chance that the cash may get used in some non-priority activities or for some non-productive works e.g. on marriage of girls, alcohol, etc. rather than being used for the right purposes.
- The country may not be able to reach its desired goals such as food grain production may not be enough to support the huge population and create the problem of food security instead.
- This will also open the country to volatility of market mechanisms.
- Widespread illiteracy and lack of awareness may also hamper the prospect of Agriculture in the country.

2.2.2. Indirect Subsidies

Indirect subsidies are provided through price reduction, welfare and other ways but do not include a direct cash payment. They reach the farmers alongside the use of inputs. Therefore, these are highly correlated with the amount of use of inputs by farmers. Generally, those farmers who use more inputs would naturally enjoy higher subsidies. Example cheaper credit, farm loan waivers, reduced tariffs for electricity and irrigation etc.

Advantages of Indirect Subsidies

- In developing economies such subsidies can be deployed to address development concerns of priority sectors.
- Generally, indirect subsidies are better tools at the Government's disposal to fulfill some targets fixed by it or to guide people to move towards required goal.

Disadvantages of Indirect Subsidies

- It takes away incentives from other areas, such as Indian agriculture has become cereal centric, regionally biased, and input intensive. Indirect subsidies are one of the main reason towards such a state.
- Farmers do not feel the incentive to save resources such as over exploitation of ground water, indiscriminate use of fertilizers, etc. are resulting due to it.
- Indirect subsidies are not successful in reaching the target beneficiaries because of several lacunae in identification, corruption, lobbying by rich farmers etc.
- It is liable for misuse for gaining political mileage especially during time of elections.

2.3. Issues related to Agriculture Subsidies and their Possible Resolution

1. **Heavy Fiscal Burden:** In 2017-18, the annual central government subsidies to farmers was of the order of Rs. 120,500 crores. In the same period, the annual State government subsidies are almost of an equal amount of Rs. 115,500 crores.

Student Notes:

Table 2: Expenditure on Major Agricultural Subsidies (Rs. Crores)

Name	Source	Year	Year
Fertilizer	Union Budget	2017/18	70,000
Power	Dharmadhikari et.al (2018) based on Power Finance Corporation data	2015/16	90,000
Credit	Union Budget	2017/18	20,000
Irrigation	Central Water Commission (2017)	2013/14	17,500
Crop Insurance	Union Budget	2018/19	13,000
Price Support	Author's estimate	2014/15-2016/17	24,000
Total (without inflation to 2017/18 price levels)			2,35,500
Lona waivers	PRS Legislative Research https://www.prsindia.org/policy/discussion-papers/state-state-finances-2018-19	2017/18	1,22,200

Source: Compiled from the sources mentioned in the Table. The price support subsidy are the author's computations.

Table 3: The Division of Agricultural Subsidies Between the Centre and the States (Rs. Crores)

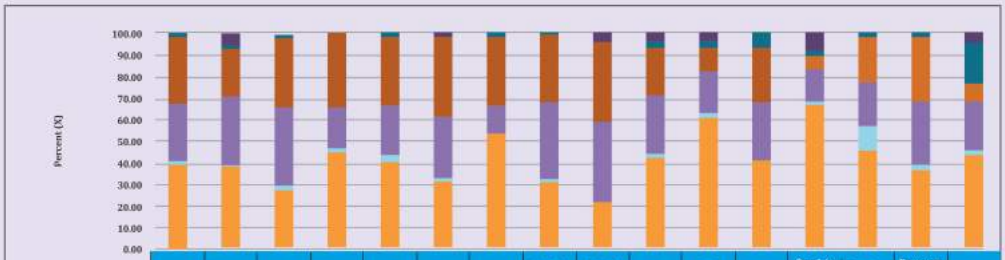
Central Government Subsidies	Amount
Fertilizer	70,000
Credit	20,000
Crop Insurance	6,500
Price Support	24,000
Total	1,20,500
State Government Subsidies	
Power	91,000
Irrigation	17,500
Crop Insurance	6,500
Lone Waivers	1,22,200
Total	2,37,200

- **Possible Resolution**: A better targeting of subsidies with the usage of JAM (JanDhan – AADHAAR- Mobile Number) trinity can reduce the fiscal burden.

2. **Excessive use of natural resources:** The policy design and implementation is such that it is skewed towards the excessive use of subsidized resources. For instance, power subsidy has led to overuse of ground water which has further resulted into dramatic fall in ground water levels. Electricity consumption in Indian agriculture is far greater than in any comparable large country. Water extracted from deep inside earth has shown contamination of Arsenic and other heavy metals.

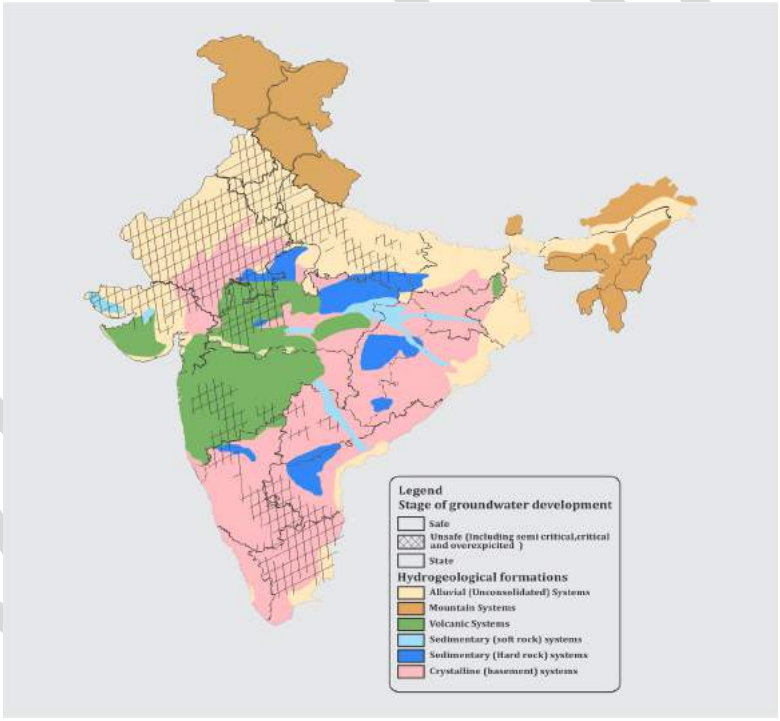
Student Notes:

International Comparison of Electricity Consumption Across Sectors (Proportions)



	Australia	Canada	France	Germany	Italy	Japan	Korea	United Kingdom	United State	World	South Africa	Brazil	People's Republic of China	Russian Federation	European Union -28	India
Non-specified (other)	0.00	5.89	0.40	0.00	0.00	2.18	0.00	0.00	4.34	4.07	1.65	0.00	8.29	0.00	0.33	5.20
Agriculture/Forestry	1.18	1.92	2.11	0.00	1.91	0.29	2.78	1.23	0.73	2.84	2.81	5.34	2.15	2.19	1.70	17.81
Commercial & public services	30.43	21.32	31.69	27.86	31.44	35.80	30.55	30.69	35.64	22.06	13.86	26.61	6.06	20.57	29.81	8.26
Residential	27.89	33.02	35.98	25.27	22.83	28.79	12.93	35.87	37.41	26.99	19.07	26.37	15.22	19.78	29.01	22.92
Transport	2.29	1.01	3.00	2.26	3.72	1.87	0.41	1.40	0.20	1.53	1.90	0.56	1.27	12.23	2.29	1.71
Industry	38.20	36.84	26.82	44.61	40.11	31.07	53.33	30.81	27.68	42.52	60.71	41.12	67.02	45.23	36.86	44.11

- **Possible Resolution**: Separate agriculture feeder network (under Deen Dayal Upadhayay Gram Jyoti Yojna). This separate agriculture feeder will supply electricity only for a few hours a day. The process has shown positive results in arresting decline of ground water levels in Gujarat.



3. **Environmental Effects and decline in Soil Fertility:** The Parliamentary Standing Committee on Agriculture in their 29th Report (16th Lok Sabha) observed that there is an imbalance in fertilizer use in terms of NPK as it is evidenced by their wider consumption ratio of (6.7) : (2.4) : 1 in the country as against their desirable ratio of 4:2:1. The situation is more grim in agriculturally important States like Punjab and Haryana where NPK use ratio is as high as (31.4) : 8 : 1 and (27.7) : (6.1) : 1, respectively. This harms the soil fertility, biodiversity, and also leads to eutrophication (increased nutrients in water bodies, eventually leading to decreased oxygen concentration in them) and bio-accumulation/bio-magnification (increasing concentration of toxic material in tissues of living organisms at successively higher levels in a food chain).

- **Possible Resolution**: Creating awareness among farmers, increasing penetration of soil health card scheme, promoting organic farming and innovative products like neem-coated urea will go a long way to check the issue.

4. **No benefits to the targeted groups:** Fertilizer subsidies are generally cornered by the manufacturers and the rich farmers of Punjab, Haryana and Western UP.
   - **Possible Resolution:** Nutrient based subsidy and Neem-Coated Urea has been introduced by Government. There should be Direct Benefit Transfer of fertiliser subsidy through Aadhaar authentication, organic farming should be encouraged and there should be phased increase in the price of urea.
5. **Cereal Centric, Regionally Biased, and Input Intensive:** Price subsidies has affected Indian agriculture negatively. This has made Indian agriculture cereal centric, and neglectful towards pulses, oil seeds and coarse cereals. This has led to import of these crops and food insecurity in lower strata which depend upon coarse cereals. Also, most of the subsidies go to the rich farmers, and the rich states which are able to grow marketable surplus and have well developed infrastructure.
   - **Possible Resolution:** Crop diversification by including more crops under MSP, Mission on Integrated Development of Horticulture, Organic and Cooperative farming, food processing, mixed farming, Direct Benefit Transfer.
6. **Indiscriminate use of Price Subsidies:** Although price subsidies are better targeted, they tend to create inefficiencies since they embed incentives for fraud, diversion, and waste. Such subsidies eventually become entrenched, accumulate and may ultimately pose a threat to the sustainability of subsidies itself.
   - **Possible resolution:** Alternatives to price interventions that have similar advantages of targeting beneficiaries must be explored and tried. For instance, Price deficiency payments are a substantial improvement on procurement-based price supports.
7. **Better use of credit or interest subsidies:** There is no strong rationale backing credit and interest subsidies. This is because formal sector interest rates have not been the constraint to increasing access to formal sector institutions.
   - **Possible Resolution:** These subsidies would be better spent in strengthening the credit infrastructure and rural banking.

2.4. Agriculture Subsidies and WTO

2.4.1. Historical Background

Agriculture sector has historically been subject to government interventions more than any other sector. Although, agriculture was covered by the General Agreement on Tariffs and Trade (1948), there were numerous exemptions related to it. Consequently, agricultural trade remained free of the strict discipline as enforced more generally to trade in industrial products. Resultantly, measures that obstructed imports began to be used widely, for instance, import bans, import quotas, high import duties, variation in import duties rates, minimum import prices, and various impediments not related to tariffs such as regulations and the activities of state trading enterprises. Similarly, richer countries offered huge subsidies, thereby artificially increasing production and exports and driving down world prices. Developing countries' also followed trade distorting practices like taxing exports or requiring purchases at low prices.

As a result, the world embarked on a series of negotiations beginning in 1986 with the launch of the Uruguay Round, to comprehensively look at the sector and suggest, implement and monitor reform measures.

A. Uruguay Round, 1995

a) It led to the formation of WTO. One of the main objectives of Uruguay round was to reduce agricultural subsidies. The **Agreement on Agriculture (AoA)** was signed by the WTO members.

Student Notes:

b) The agreed long-term objective of the reform process initiated by the Uruguay Round reform programme is **to establish a fair and market-oriented agricultural trading system**.
c) The reform programme comprises specific commitments **to reduce support and protection** in the areas of domestic support, export subsidies and market access.
d) The Agreement also takes into account non-trade concerns, including food security and the need to protect the environment, and **provides special and differential treatment for developing countries,** including an improvement in the opportunities and terms of access for agricultural products of particular export interest to these members.
e) The implementation period for the country-specific commitments was the six-year period commencing in 1995. However, **developing countries had the flexibility to implement their reduction and other specific commitments over a period of up to 10 years.**
f) **Special Agricultural Safeguard (SSG)** was provided to developing economies under which they can **impose an additional duty** in case of import surge (volume) or fall of import price below a specified reference price.
g) Uruguay Round created two categories of domestic support
    1. ***Support with no, or minimal, distortive effect on trade*** on the one hand (often referred to as "Green Box" measures). For example, government funded agricultural research or training.
    2. ***Trade-distorting support*** on the other hand (often referred to as "Amber Box" measures). For example, government buying-in at a guaranteed price ("market price support") falls into the Amber Box.
        - **Green Box:** These measures are **exempt from reduction commitments** and, indeed, can even be **increased without any financial limitation** under the WTO. The Green Box applies to both developed and developing country members but in the case of developing countries **special treatment** is provided in respect of governmental stockholding programmes for food security purposes and subsidized food prices for urban and rural poor. But, they must not involve **transfers from consumers** and must not have the effect of providing **price support to producers** (India's PDS does not come under Green Box). Following programs come under Green Box:
            - **Government service programs** such as Research Programs, Pest and Disease Control, training, infrastructure etc.
            - **Direct Payment to producers** but it must not influence type or volume of production, also called *Decoupled Payments*.
        - **Amber Box Subsidies:** All domestic support measures considered to distort production and trade (with some exceptions) fall into the amber box. For instance, MSP, Procurement Price, sum total of subsidies on inputs like fertilizer, water, credit, power, etc.
        - **Blue Box:** These are basically Amber Box subsidies but they tend to limit the production. Any support that would normally be in the amber box, is placed in the blue box if the support also **requires farmers to limit their production**. These measures are also **exempt from reduction commitments**. It includes **direct payments under production limiting programs**, made on fixed areas and yield or a fixed number of livestock. Such payments also fit into this category if they are made on 85 per cent or less of production in a defined base period. While the Green Box covers decoupled payments, in the case of the Blue Box measures, production is still required in order to receive the payments, but the actual payments do not relate directly to the current quantity of that production.

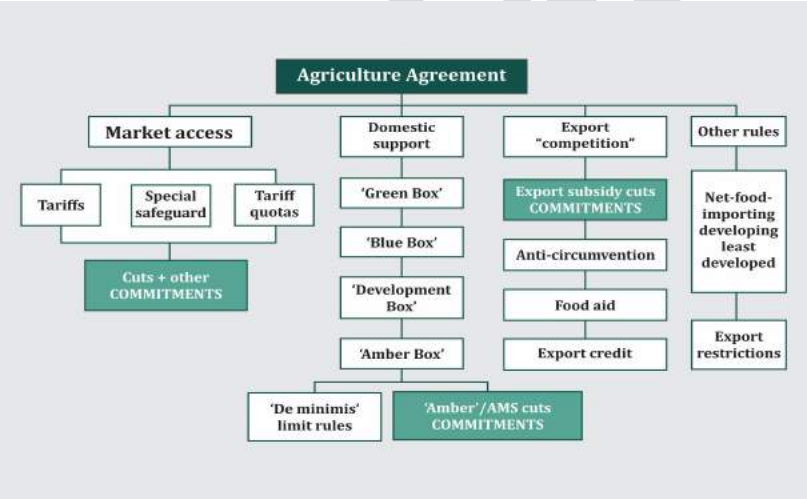
Student Notes:

- **Special and Differential Treatment Box:** The S&DT measures generally comprises of
  1. Investment subsidies like tractors and pump sets to farmers
  2. Agricultural input services like fertilizers to farmers. These subsidies should be provided only to low income and resource poor producers (or poor farmers) in developing countries.
  3. Measures for diversification of narcotics crop in order to rehabilitates the farmers.

De Minimis: Minimal amounts of domestic support that are allowed even though they distort trade. Under the de minimis provisions of the agreement:

1. There is no requirement to reduce trade-distorting domestic support in any year in which the aggregate value of the product-specific support does not exceed 5 per cent of the total value of production of the agricultural product in question.
2. Non-product specific support which is less than 5 per cent of the value of total agricultural production is also exempt from reduction.

The 5 per cent threshold applies to developed countries whereas in the case of developing countries the de minimis ceiling is 10 per cent. However, the quantum of subsidy is computed after taking into consideration prices that prevailed two decades ago. India is well below and within the de minimis level (10 per cent) for all its major crops.



Peace Clause : This clause holds that domestic support measures and export subsidies of a WTO Member that are legal under the provisions of Article 13 of the Agreement on Agriculture cannot be challenged by other WTO Members on grounds of being illegal under the provisions of another WTO agreement. The Peace Clause **expired on January 1, 2004**. Another **temporary peace clause** was made at the WTO Bali conference in December 2013 for four years until 2017. It stipulated that no country would be legally barred from food security programs for its own people even if the subsidy breached the limits specified in the WTO Agreement on Agriculture.

B. **Doha Round**

Doha round or Doha Development Agenda is the trade negotiation round of WTO which started in 2001. For agricultural negotiations, Bali Ministerial Conference (2013) and Nairobi Ministerial Conference (2015) has been important.

a) **2013 Bali Ministerial Conference:** At the Ninth Ministerial Conference in Bali (2013), members agreed on a package of issues. In agriculture, these included four decisions and one declaration:
   - An agreement to negotiate a permanent solution to **Public Stockholding for food security purposes** and to refrain from legally challenging breaches of domestic support commitments resulting from developing countries' public stockholding programmes for food security provided certain conditions are met.

Student Notes:

- Another agreement was reached to **expand the Green Box list of "general services"**. This list added the following: spending on for land use, land reform, water management, rural livelihood security and other purposes related to development and reducing poverty.
- A declaration to reduce all forms of export subsidies and to enhance transparency and monitoring. This declaration covers a wide range of issues generally known as **"export competition"**. This includes measures, like international food aid, export credits, export credit guarantees, insurance programmes etc, whose effects may be equivalent to export subsidies.
- **A temporary peace clause** was added in Bali. It stated that no country would be legally barred from food security programmes even if the subsidy breached the limits specified in the WTO agreement on agriculture. This clause will remain in force for four years until 2017, by which time the members will find a permanent solution to the problem. However, the permanent solution remained elusive after the 11th Ministerial Conference.

b) **2015 Nairobi Package:**

- WTO members adopted a historic decision to **eliminate agricultural export subsidies** and set disciplines on export measures with equivalent effect. According to the decision, members shall eliminate export subsidies according to different timelines. Developed countries to eliminate immediately, except for a limited number of agriculture products, while developing countries to end it by 2018. This step has been taken to fulfill the key target of **Sustainable Development Goal on Zero Hunger by 2030**.
- Member nations also agreed to **discipline in food aid** i.e. ensuring that food aid does not negatively affect domestic producers and local or regional markets.
- WTO members **agreed to engage constructively** in finding a permanent solution to developing countries' use of public stockholding programmes for food security purposes.
- Ministers also agreed to continue negotiations on a **special safeguard mechanism (SSM)** that would allow developing countries to temporarily raise tariffs on agriculture products in cases of import surges or price falls.

The adoption of the Nairobi Ministerial Declaration signaled the strong commitment of member nations to advance negotiations on the remaining Doha Round issues, including advancing work in all three pillars of agriculture i.e. domestic support, market access and export competition.

2.4.2. Indian Agriculture Subsidies and WTO

India had signed Agreement on Agriculture of WTO expecting that it would:

- reduce the domestic support given by OECD countries to their respective agricultural sectors
- increase the prices of agricultural products in international markets
- improve export prospects for India.

But, to its surprise, the agricultural prices went down, putting agricultural countries like India at disadvantage. India has the following contentions with respect to the AoA and the WTO.

Student Notes:

Permanent & Workable solution to food security at WTO:

- India insists that member countries of the WTO agree to a permanent solution to the dispute over public stockholding of foodgrains, even though developing nations have been granted an indefinite interim reprieve. The issue of public stockholding of food revolves around the **procurement of foodgrains from farmers at prices fixed by governments in order to promote the food security of poor countries.** As these prices involve a degree of government subsidy, there is a cap on these subsidies as they could otherwise end up distorting global prices. However, developing countries insist that they should not be penalized for breaching any limits, arguing that such stockholdings are crucial for food security.
- At the Bali meetings of the WTO in Dec 2013, India, along with other developing countries, was able to negotiate a "peace clause" that allowed it to go beyond the 10 % cap for its MSP with immunity from legal challenge from other WTO member countries for the next four years, within which time period a permanent solution would be devised. However, India is **not satisfied with the peace clause for perpetuity.**
- Even at the Nairobi declaration, India failed in its objectives to secure credible outcomes on its demands for a permanent solution for public stockholding programmes for food security and the reaffirmation to continue the Doha Development Agenda negotiations.
- Furthermore even at the eleventh Ministerial Conference (MC11) in Buenos Aires, there was no outcome on public stockholding for food security purposes or on other agriculture issues.

High farm subsidies provided by developed countries:

- Under Agreement on Agriculture (AoA), developing countries can give agricultural subsidies or aggregate measurement support (AMS) up to 10% of the value of agricultural production and developed countries give up to 5%.
- AMS has two components:
  - 'product-specific' or the excess of price paid to farmers over international price or ERP (external reference price) multiplied by quantum of produce. This is frozen at 1986-88 levels which makes entitlements of developed countries much higher than developing countries

Student Notes:

- ‘non-product specific’ or money spent on schemes to supply inputs such as fertilisers, seed, irrigation, electricity at subsidised rates.

- Developed members provide subsidies, which, at times, exceed 200 per cent of the production value, despite the 5 per cent de minimis. The WTO rules make it possible for rich countries to get away with such high subsidies as their historical bound AMS levels are high.
- The discrepancies had crept in when the Agreement on Agriculture was being negotiated. Developed countries exercised an option of either accepting a product specific ceiling of 5 percent, or an overall cap.
- The developed world, by having an overall ceiling for all farm products, can manipulate the subsidies for individual products. For example - US has continued to provide product-specific support to the tune of 10% of the value of product for 30 products for at least one year during the period 1995-2014. It provided subsidies exceeding 50% of value of production for dry peas (57%), rice (82%), canola (61%), flaxseed (69%), sunflower (65%), sugar (66%), cotton (74%), mohair (141%), and wool (215%).
- In 2017, developed countries have more than 90% of global AMS entitlements amounting to nearly $160 billion while India and China do not have any AMS entitlements.
- Developed countries label most of the sops as non-trade distorting (green-box subsidy at the WTO) which, supposedly, have minimal effect on world trade. The highest green box support to agriculture is provided by USA which spends more than third of its GDP from agriculture on this support, while India provides support of only 2.34% of its GDP from agriculture in 1995. Investment in agriculture has been between 8% to 12% of agri-GDP.
- The developed countries are not ready to admit that there exists variation in capacity and structural composition of the economies of developed and developing countries. A developed country might need only 1-2% of its GDP to subsidise 50% of its agriculture. Hence, **distortions arising out of Green Box subsidies are significant but are inadequately addressed.**

Use of Sanitary & Phytosanitary Measures & Technical Barriers to Trade by Developed Countries:

- The developed countries also make use of Non-tariff measures like **Agreement on Sanitary and Phytosanitary Measure (SPS) and Agreement on Technical Barriers to Trade (TBT)** to selectively ward off imports from developing countries by imposing higher standards than those imposed by international bodies. According to recently published “The Asia-Pacific Trade and Investment Report 2019” by UNCTAD, use of non-tariff measures (NTMs) has increased in the past two decades.
  - **Agreement on Sanitary and Phytosanitary (SPS) Measures 1995, Uruguay Round**: It sets out the basic rules for food safety and animal and plant health standards. It **allows countries to set their own standards**. But it also says regulations must be based on science. They should be applied only to the extent necessary to protect human, animal or plant life or health. And they should not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail.
  - **Agreement on Technical Barriers to Trade 1995, Uruguay Round**: It aims to ensure that technical regulations, standards, and conformity assessment procedures are non-discriminatory and do not create unnecessary obstacles to trade. At the same time, it recognises WTO members' right to implement measures to achieve legitimate policy objectives, such as the protection of human health and safety, or protection of the environment. The TBT Agreement strongly encourages members to base their measures on international standards as a means to facilitate trade. Through its transparency provisions, it also aims to create a predictable trading environment.

Student Notes:

3. Agriculture Pricing Policies

The agricultural pricing policies and allied institutional mechanisms evolved in India in the context of shortages in the availability and excess demand for food grains during 1960s. A system of procurement and distribution of major food grains was introduced and statutory minimum prices were set, though not strictly enforced. India's agricultural price policy includes three main types of administered prices: **support, procurement,** and **issue price**.

The support price is generally announced at sowing time, and the government agrees to buy all grain offered for sale at this price. These prices guarantee to the farmer that, in the event of excessive production leading to oversupply in the market, prices of his produce will not fall below the support price. Support prices generally affect farmers' decisions indirectly, regarding land allocation to crops. The areas to be sown, however, depend upon the actual prices farmers realized from the previous crop and their expectations for the coming season.

The quantity to be procured is determined by the government's needs for disbursements under the public distribution system. In recent years, however, the actual quantities procured have depended upon the grain offered for sale by farmers at prices fixed by the government. These prices are generally higher than the support prices but lower than the free market prices in normal years. In a good crop year, in surplus states, free market prices would have been lower but for government purchases; after the surplus is mopped up, market prices tend to run higher than procurement prices. The government recognizes the importance of assuring reasonable prices to farmers to motivate them to adopt improved technology and to promote investment by them in farm enterprises for increasing agricultural production.

Minimum Support Prices	These provide a long term guarantee to the producers, that in case of glut, prices will not fall below these announced minimum prices. The Government started large scale procurement of food grains at the MSP to ensure its intent.
Procurement Prices	These are higher than MSP and are meant essentially for the purchase of quantities needed by the Government to maintain its PDS and for building up the Buffer Stock.
Issue Prices	These indicate prices at which the Government supplies food grains through Fair Price shops and ration depots.

The basic objective of agricultural pricing policy in India is to evolve a balanced and stable price structure to meet the overall needs of the economy while protecting, in particular, the interests of the producers' and the consumers'. The policy is aimed towards facilitating the desirable path of attaining the objectives of growth and equity in the process of economic development.

Incentive prices in the form of minimum support prices are essential for the success of agricultural production programs based on high-yielding-varieties technology. At the same time, undue reliance cannot be placed on high prices alone as an incentive for increasing production of food grains. Effective implementation of price support policies requires adequate institutional arrangements for the purchase of quantities offered for sale at that price.

3.1. Minimum Support Price

Even prior to the mid 1960's, it was recognized that farmers need to be motivated to adopt better technology and to invest more in their farm enterprises, for the acceleration of agricultural growth. This objective, however, was difficult to achieve without assuring reasonable prices to the farmers. Consequently, the Government constituted a committee in 1964-65 to suggest a price policy for food grains and to suggest the terms of references for an organization which would be set up to advice the government on price policy on a long term basis.

The recommendations of the committee led to the establishment of the **Agricultural Price Commission** in **1965** which was later renamed as **Commission for Agricultural Costs and Prices (CACP)** in March **1985**. Simultaneously, the development strategy for agricultural sector was

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also remodeled. Such remodeling of strategy included application of modern inputs like high yielding varieties of seed (HYV), chemical fertilizers and mechanization of certain agricultural operations. The main emphasis was on finding methods of increasing land productivity through the use of modern input and improved methods of production in the potential regions of the country.

This development strategy, in turn, required that the price policy should encourage farmers to make greater investments in farm operations so as to enable them to shift on to higher production possibility curves. The minimum support price was aimed at:

- Assuring **remunerative and relatively stable price environment** for the farmers by inducing them to increase production and thereby augment the availability of food grains.
- Improving economic **access of food** to people.
- Evolving a **production pattern** which is in line with overall needs of the economy.

Therefore, the provision of Minimum Support Prices (MSP) was initiated during the mid-1960s to create a favorable environment for the producers of major food crops, which were seen to possess a vast potential for raising foodgrain production.

Commission for Agricultural Costs and Prices (CACP)

The Commission for Agricultural Costs & Prices (CACP) is an attached office of the Ministry of Agriculture and Farmers Welfare, Government of India. It came into existence in January 1965. Currently, the Commission comprises a Chairman, Member Secretary, one Member (Official) and two Members (Non-Official). The non-official members are representatives of the farming community and usually have an active association with the farming community.

It is mandated to recommend minimum support prices (MSPs) to incentivize the cultivators to adopt modern technology, and raise productivity and overall grain production in line with the emerging demand patterns in the country

MSP for major agricultural products are fixed by the government, each year, after taking into account the recommendations of the Commission.

As of now, CACP recommends MSPs of 23 commodities, which comprise

- 7 cereals (paddy, wheat, maize, sorghum, pearl millet, barley and ragi)
- 5 pulses (gram, tur, moong, urad, lentil/Masur)
- 7 oilseeds (groundnut, rapeseed/mustard, soyabean, seasmum, sunflower, safflower, nigerseed)
- 4 commercial crops (copra, sugarcane, cotton and raw jute).

CACP submits its recommendations to the government in the form of Price Policy Reports every year, separately for six groups of commodities namely Kharif crops, Rabi crops, Sugarcane, Raw Jute and Copra.

3.1.1. Need of MSP Policy

The prices of agricultural commodities are inherently unstable, primarily due to the variation in their **supply**, lack of **market integration** and **information asymmetry**. It is to counter such variation that the Union Government fixes a Minimum Support Price (MSP) for major agricultural products each year. The MSP is hence a tool which guarantees the farmers, prior to the sowing season, that a fair amount of price is fixed for their upcoming crop to encourage higher investment and production of agricultural commodities.

Rapid and violent fluctuations in agricultural prices can have negative consequences on the economy of a country, such as:

a) Significant harvest in a year can result in a sharp fall in the price of that commodity during that year. This, in turn, has an adverse impact on the future supply since farmers may withdraw from sowing that crop in the following years. This contraction of supply in the following year may lead to subsequent major price increase for consumers.

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b) In case, the price of a particular crop declines steeply: growers will be left with little income and no incentive to grow the same crop next year. If this happens to a staple food item, the reduced supply next year will force the government to import that food item to fulfill the demand of people. This will create a fiscal burden over economy.

THE VARIABLES IN THE EQUATION

CROP	A2+FLCOST	C2 COST	MSP 2017-18	MSP 2018-19
Paddy	1,166	1,560	1,550-1590	1,750-1,770
Jowar	1,619	2,183	1,700-1725	2,430-2,450
Bajra	990	1,324	1,425	1,950
Ragi	1,931	2,370	1,900	2,897
Maize	1,131	1,480	1,425	1,700
Tur	3,432	4,981	5,450	5,675
Moong	4,650	6,161	5,575	6,975
Urad	3,438	4,989	5,400	5,600
Groundnut	3,260	4,186	4,450	4,890
Sunflower	3,592	4,501	4,100	5,388
Soyabean	2,266	2,972	3,050	3,399
Sesasum	4,166	6,053	5,300	6,249
Nigerseed	3,918	5,135	4,050	5,877
Cotton	3,433	4,514	4,020-4,320	5,150-5,450

All Figures in Rs/quintal. A2+FL and C2 costs based CACP projection for 2018-19; price ranges of paddy for 'Common' and 'Grade A' varieties; of jowar for Hybrid and Maldandi varieties; of cotton for Medium-Staple and Long-Staple varieties

c) In case, there is steep rise in price of a commodity: consumers will suffer. If this happens to a necessary item of consumption, consumers will not have enough income left to spend on some of the other items. This will have a disastrous effect on other sectors of the economy.

Determination of MSP

- MSP's of 23 crops is recommended by Commission for Agricultural Costs and Prices (CACP). The CACP is supposed to consider various factors while recommending the MSP for a commodity, including cost of cultivation. It also takes into account the supply and demand situation for the commodity; market price trends (domestic and global) and parity vis-à-vis other crops; and implications for consumers (inflation), environment (soil and water use) and terms of trade between agriculture and non-agriculture sectors.
- The CACP further projects three kinds of production cost for every crop, both at state and all-India average levels. These include:
  - **Cost A_2**: Includes the actual costs paid by farmer for purchase of various inputs like seeds, fertilisers, pesticides, hired labour, rent of land & machinery, if hired.
  - **Cost A_2 +FL:** FL refers to Family Labour. When the unaccounted family labour cost is accounted and added to cost A_2, it becomes A_2+FL.
  - **Cost C_2:** C_2 stands for Comprehensive Cost. It includes notional costs of family labour, notional rent of owned land and notional interest on owned capital.
- The CACP does not do any field-based cost estimates itself. It's projections are based on the state-wise, crop-specific production cost estimates provided by the Directorate of Economics & Statistics in the Agriculture Ministry.
- These projections take into account likely changes in input costs based on the latest price data from other sources such as the Labour Bureau and Office of the Economic Adviser.

Recent changes to MSP calculation by the Union Government

- In 2014 the union government has promised to offer 50 per cent margin over cost C_2 but this was never implemented in letter and spirit.
- The Budget for 2018-19 announced that MSPs would henceforth be fixed at 1½ times of the production costs for crops as a "pre-determined principle". Simply put, the CACP's job will be only to estimate production costs for a season and recommend the MSPs by applying the 1.5-times formula.
- The Budget speech did not specify the cost on which the 1.5-times formula was to be computed. However, the CACP's 'Price Policy for Kharif Crops: The Marketing Season 2018-19' report states that its MSP recommendation is based on 1.5 times the A2+FL costs.
- Farm activists, however, insist upon the application of the 1.5-times MSP formula, originally recommended by the National Commission for Farmers headed by agricultural scientist M S Swaminathan, on the C2 costs.

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In addition to the MSP announced by the Central Government, the State Governments also declare a bonus, over and above the already declared MSP so as to promote agriculture practices in their respective States. The quantum of this bonus varies from state to state and from crop to crop.

Constraints in hiking MSP

- Some of the government officials are of the opinion that it is impractical to give 50 per cent margin over cost C_2 in all crops.
  - The estimated cost of C_2 components is about 35-40 per cent higher than cost A_2+FL. This would require a significant rise in MSPs. For example paddy MSP might go up by 46 per cent.
  - Calculating the MSPs based on cost of input components ignores the demand side of crops which might compromise the demand-supply principle for determining the cost.

3.1.2. Critical Evaluation of Minimum Support Price

India's price support policy has proved to be helpful in several ways. From a situation of massive shortages, India has emerged as a grain surplus country with self-reliance in food grains, and this inherent process of self-sufficiency subsumed the inbuilt proposition of attaining food security at the national level. A strong base has been created for grain production and for meeting grain demand in the medium term. The policy has had a favorable impact on farm income and has led to an economic transformation in the well-endowed, mainly irrigated regions. Although price support policy through advance announcement of MSP and procurement prices by CACP (Commission for Agricultural Costs and Prices) provides an assurance to the farmers to confidently invest in the crops, there are several fallouts from this regime that deserve attention:

a) **Contributes to inflationary trend:** There has been continuous hike in MSP and Procurement prices due to the rich farmers' lobby and it has pushed up the carrying cost of buffer stocks of FCI considerably. This has pushed up the food subsidy bill to a very high level.
b) **Bias in favour of surplus states:** Almost all states produce wheat, but 95% procurement is from Punjab, Haryana and Western UP. Similarly, around 20 states produce rice, while 90% is procured from Punjab, Andhra Pradesh, Haryana, UP and Tamil Nadu. Other states do not get much benefit from it.
c) **Adverse impact on investment:** Due to extra expenditure in food procurement, the other sectors loses out on new investments. It has been observed that a 10% increase in MSP of wheat and rice leads to a decline in investment by 1.9% and in overall GDP by 0.33%.
d) **Distortion in cropping pattern:** MSP of wheat and rice has generally been higher than the cost of production and that of cereals and pulses has been less than the cost of production. So farmers get incentivised for growing profitable crops and hence cropping pattern gets distorted.
e) **Faulty criterion being used for calculating MSP:** Since cost of production is the major criterion to decide MSP by CACP, inefficiency gets built up, land unsuitable for cultivation of particular crop is being used e.g. rice cultivation is being done in semi-arid regions of Punjab & Haryana which is creating environment and natural resources problem.
f) **Bias in favour of large farmers**: It has been estimated that in each state, the average income transfer to large farmers is approximately ten or more times greater than those received by marginal farmers.
g) **Deterrent to crop diversification:** The price support policy has been a major deterrent to crop diversification. It is highly asymmetric and skewed mainly towards the production of rice and wheat at the cost of cultivation of pulses, oilseeds and other crops. This has created serious imbalances in demand and supply of principal crops in the country. Similarly, the country has been facing large shortages of pulses and edible oils and now has to meet about one-tenth of its demand for pulses and close to half of the demand for

edible oil through imports. These imports are in turn having an adverse impact on producers in the unfavorable dry-land areas

h) **Flaws in PDS:** It is restricted mainly to wheat and rice only, while inferior grains which are main food of the poor have been neglected, PDS coverage in rural areas have been lesser than that in urban areas, high cost of running, and benefits not reaching the targeted beneficiary are the major flaws in PDS.

i) **Impact on rural poor:** Rise in price of cereals (due to higher MSP) leads to significant burden of high cost for the buyers.

j) **Price incentives and fiscal squeeze:** Because of the price incentives, there is an agricultural price rise. Since wages are linked to the agricultural price, it will end up in raising wage cost in non-agriculture sector and hence fall in private profits. This will lead to less tax collection by Government. Also, fall in purchasing power of people due to price rise will compress effective demand and hence will affect the economy negatively.

These changes necessitate a fresh look at the role and relevance of the Minimum Support Price system in the country. Announcing procurement prices has become one of the primary tools of intervention in agriculture while other crucial issues like fall in capital formation, developing irrigation facilities, need of changing land holding pattern etc. have been ignored.

4. Farm Acts 2020 and their impact on Pricing Policy of the Government:

The Union Government introduced three Acts on agriculture reforms in the Parliament to replace ordinances issued during the lockdown. These three acts are:

a) The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020
b) The Farmers (Empowerment and Protection) Agreement of Price Assurance and FarmServices Act, 2020
c) The Essential Commodities (Amendment) Act, 2020

The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020 contains the following key provisions:

- It opens up agricultural sale and marketing outside the notified APMC Mandis for farmers.
- Further it removes barriers to inter-state trade.
- It also provides a framework for electronic trading of agricultural produce
- It prohibits State Governments from collecting market fee, cess or levy for trade outside the APMC markets.

The Farmers (Empowerment and Protection) Agreement of Price Assurance and Farm Services Act, 2020 is related to Contract Farming and enlists the following key provisions:

- It provides a framework on trade agreements for the sale and purchase of farm produce.
- The mutually agreed remunerative price framework envisaged in the legislation has been conceived to would protect and empower farmers
- The written farming agreement, entered into prior to the production or rearing of any farm produce, lists the terms and conditions for supply, quality, grade, standards and price of farm produce and services.

Similarly, the key provisions of the Essential Commodities (Amendment) Act include:

- Removal of cereals, pulses, oilseeds, edible oils, onion and potatoes from the list of essential commodities. The amendment seeks to deregulate the production, storage, movement and distribution of these food commodities.
- The central government is allowed regulation of supply during war, famine, extraordinary price rise and natural calamity, while providing exemptions for exporters and processors at such times as well.

Student Notes:

- Imposition of any stock limit on agricultural produce must be based on price rise. A stock limit may be imposed only if there is a 100% increase in retail price of horticultural produce; and a 50% increase in the retail price of non-perishable agricultural food items

It is argued that the phased dismantling of the monopoly of the APMCs indicates the end of assured procurement of food grains at minimum support prices (MSP). Farmers and rights activists suggest that instead of dismantling the monopoly of APMC's, the centre should focus on getting a larger number of farmers for their produce and addressing weakness in the APMCs.

However, there is no such provision in the Act that indicates the end of the current system of minimum support price (MSP)-based procurement of foodgrains (essentially wheat and paddy) by government agencies. The Centre has assured the continuance of the purchases in state-regulated APMC mandis. Also, the APMCs wouldn't stop functioning. The Act only adds an alternative platform for farmers to sell their produce.

5. Previous Years' UPSC Questions

1. What are the different types of agriculture subsidies given to farmers at the national and at state levels? Critically analyse the agricultural subsidy regime with reference to the distortions created by it. (2013)
2. How do subsidies affect the cropping pattern, crop diversity and economy of farmers? What is the significance of crop insurance, minimum support price and food processing for small and marginal farmers? (2017)
3. What do you mean by Minimum Support Price (MSP)? How will MSP rescue the farmers from the low income trap? (2018)

6. Vision IAS GS Mains Test Series Questions

1. ***With reference to Bali decision clearly stating that Peace clause under Agreement on Agriculture (AoA) would remain in force, until permanent solution is found, can we say that India was at least partially successful in placing 'Food Security Box' and 'Development Box' alongside 'Green Box'? Analyze. Also, suggest some remedies to counter the adverse effects of huge Green Box subsidies offered by developed nations to their farmers.***

Approach:

- Briefly write about the Agreement on agriculture and the need for food security box and developmental box alongside Green box.
- Then explain about the Bali decision to include peace clause until permanent solution is found and its significance for India.
- Write briefly about the adverse effects of huge Green Box subsidies offered by developed nations to their farmers and suggest some remedies to counter them.

Answer:

There has been a demand for 'Development Box' and 'Food Security Box' along with 'Green Box' in agreement on agriculture (AoA) in order to cater to the needs of food security, rural development, and poverty reduction in developing countries. The basic aim is to ensure that developing countries have the policy flexibility to support domestic agricultural production and ensure the food security of their population.

With the recent rise in global food prices, many countries have begun giving higher subsidies to farmers to promote agriculture, putting them in danger of breaching the 10 per cent cap under the deminimus levels.

During the 9th ministerial conference held in Bali a 'peace clause' was agreed between developed and developing countries. The 'peace clause' said that no country would be

Student Notes:

legally barred from food security programmes even if the subsidy breached the limits specified in the WTO agreement on agriculture. This 'peace clause' is expected to be in force for four years until 2017, by which time a permanent solution to the problem will be found.

With reference to this outcome, one can correlate to the provisions of Green Box subsidies allowed under AoA which includes items like decoupled income support, research expenditures, pest control measures, training & extension expenses and promotion expenses and infrastructure expenses. However some of the direct payments are also listed in this category. There is ambiguity in head and expense classification, which makes this subsidy highly contentious as many developed nations misuse the loopholes under this category to support their farmers, USA being at the top with 1/3rd of GDP support.

So we can definitely say that with the Bali statement regarding peace clause, India was at least partially successful in placing the 'Food Security Box' and 'Development Box' alongside the 'Green Box'. However India and other developing countries should be cautious of following issues.

- Accepting a temporary peace clause should not be amounted to admitting that the subsidy programmes in India and other developing nations violate global trade norms.
- If the clause expires before a permanent solution is in place, food security programmes and policies to protect farmers, such as Minimum Support Prices, would come under siege.
- The peace clause requires full disclosure of MSPs and annual procurement for food security programmes, which might leave India open to questioning by other countries on domestic matters.

Hence there is a need for permanent solution in this regard to ensure food security programme in developing countries.

The WTO agreement with its complex structure provides enough room for maneuvering subsidies to provide protection to domestic produce under the Green Box subsidies. Level of subsidies is so high in developed countries that level playing filed in agriculture trade is a far cry. To counter adverse effect of such support and subsidies following suggestions are made:

- Developing countries should seek clubbing of all kinds of support to agriculture in one category and seek some parity among developed and developing countries.
- Other member countries should have the freedom to impose protective tariff linked to differences in domestic support.
- In order to counter the adverse impact of GBS in other countries on domestic produce, we need to pay serious attention to infrastructure development, which has been deteriorating for quite some time.

2. Agricultural subsidies are hotly contested at the WTO negotiations. What are the concerns of developing countries, especially India, vis-a-vis the attitude of developed countries on the issue? What is Special Safeguard Mechanism (SSM)? In this context, what are the reasons underlying India's keenness on a permanent solution on public stockholding for food security?

Approach:

- Describe the reservations of developing countries in respect of agricultural subsidies at WTO negotiations. It should be a comparative outlook vis-a-vis developed countries.

Student Notes:

- Define Special Safeguard Mechanism, and mention its ad-hoc nature.
- Finally, mention why India is keen on a permanent solution on public stockholding.

Answer:

Agriculture occupies crucial space at the WTO negotiations and the issue of subsidies therein is a bone of contention between the developing countries such as India and developed countries such as the United States and those from Europe. The Agreement on Agriculture has been criticised for reducing tariff protections for small farmers in developing countries while simultaneously allowing rich countries to continue subsidizing agriculture at home.

The concern of developing countries regarding the attitude of the developed countries can be summed up thus:

- Whereas the developed countries want subsidies to be removed, the developing countries view agricultural subsidies as crucial for their farm livelihood and food security.
- The box-shifting practices and use of green box as well as amber box subsidies by rich countries such as US cause concern in developing countries. For example under a 2006 ministerial agreement, agriculture subsidies in rich countries were to be eliminated by 2013 to spur export competition in global agriculture, but this did not happen. In fact, new policies, such as the US Farm Bill of 2014 have ensured that there will be no cut in their export subsidies.
- The insistence of countries such as US for Countries like India to limit Amber box subsides to 1986 production (not adjusted to inflation) is a major bone of contention.
- While developed countries including the US, Australia, the EU oppose public stock-holding of food crops, it is crucial for India's food security programme.
- The developing countries are concerned about the issue of import surges and tariffs to be imposed in case of livelihood threatening. This is perhaps most visible in the differences over the structure of the Special Safeguard Mechanism (SSM).

Special Safeguard Mechanism (SSM) is a trade remedy that allows developing countries to impose additional safeguard duties in the event of an abnormal surge in imports or the entry of unusually cheap imports.

India argued for higher level of tariff and lower import surge for making the SSM. On the other hand, the US and allies argued for lower tariffs and higher imports. India and the G33 insist that the SSM mechanism can come into play if imports rise by about 10%, while developed countries want it as 40%.

For a permanent solution, India had proposed either amending the formula to calculate the food subsidy cap of 10 per cent, which is based on the reference price of 1986-88, or allowing such schemes outside the purview of subsidy caps of the AOA. This would enable India to continue with its policy of public stockholding for food security without violating any of the extant provisions.

3. What are the twin objectives of government food procurement policy in India? Discuss the instruments of this policy. Do you think there is an urgent need for rationalization of MSP policy in India?

Approach:

- The introduction should enumerate the twin objectives of food procurement policy.
- Then discuss the instruments of the policy.
- Finally, critically examine the present MSP policy.

Student Notes:

Answer:

The food procurement policy of the Indian government is geared to achieve the twin objectives of

- serving consumers through price subsidy; and
- supporting the price for producer.

In this context, the price instruments used are Minimum Support Price (MSP) and Central Issue Price (CIP). These can be understood thus:

- Grain procurement at MSP, maintenance of buffer stocks and distribution at subsidized rates through PDS.
- Allocation of grains to states at Central Issue Price (CIP) for distribution to consumers.

The Food Corporation of India is the agency of GoI that handles procurement, storage and transportation of grains to states. The States in turn distributes these grains through Fair Price Shops.

In recent times the MSP policy has come under criticism for:

- increasing fiscal burden.
- administrative inefficiency and creating market distortion.

The Commission for Agricultural Costs and Prices (CACP) recommends MSPs at national level for twenty three crops, but effectively price support operates primarily in wheat and rice and that too in selected states. This creates incentive structures highly skewed in favour of wheat and rice. While the country is dependent on imports for pulses and oilseeds (edible oils), their prices often fall below the MSP as there is no effective price support.

High MSPs induce distortions, some of which ultimately hurt the poor. Here are two examples:

- High MSPs result in farmers over-cultivating rice and wheat, which the Food Corporation of India then purchases and houses at great cost. High MSPs also encourage under-cultivation of non-MSP supported crops. The resultant supply-demand mismatch raises prices of non-MSP supported crops and makes them more volatile. This contributes to food price inflation that disproportionately hurts poor households who tend to have uncertain income streams and lack the assets to weather economic shocks.
- High MSPs and price subsidies for water together lead to water-intensive cultivation that causes water tables to drop, which hurts farmers, especially those without irrigation.

Thus, there is a need to rationalize MSP in order to correct the present distortions.

4. Minimum Support Price (MSP) of crops is a short term solution for agricultural distress which creates long term problems. Examine. Suggest measures to overcome the limitations of the MSP regime.

Approach:

- Briefly explain the concept of MSP and its importance.
- Examine the long-term problems associated with present MSP mechanism.
- Suggest measures and alternatives to overcome the limitations of the MSP regime.

Student Notes:

Answer:

Minimum Support Price (MSP) is a market intervention by the Government to insure agricultural producers against any sharp fall in farm prices. The idea behind MSP is to give guaranteed price and assured market to the farmers and protect them from the price fluctuations and market imperfections.

However, MSP is associated with various issues such as:

- **Distortion of cropping pattern -** There has been an excess focus on the procurement of wheat, rice and sugarcane at the expense of other crops such as pulses, oilseed and coarse grains.
- **Degradation of agricultural ecosystem** – Crops which are not aligned with the agro-climatic region lead to depletion of water table, soil degradation and deterioration in water quality. For example, rice despite being unsuitable for growth in Punjab and Haryana (semi-arid regions), is widely grown there. This has led to deterioration of groundwater table.
- **Regional imbalance** – Procurement infrastructure is virtually non-existent in eastern states and as such, farmers from these states are not able to reap the monetary benefits of MSP and an assured procurement by government. The Shanta Kumar report on agriculture estimates that just around 4% of the country's farmers benefit from the MSP system.
- **Insurance not remuneration –** MSP is just an insurance and not a remunerative price - M.S. Swaminathan committee recommends fixing MSP at one-and-a-half times the cost of production.
- **Debt obligations** - Resource-poor, marginal and small landholders have to sell a substantial proportion of crops to local private traders and input dealers due to tie-up with credit.

Measures to overcome the limitations of the MSP regime

- Increase the scope of procurement under MSP regime. It should not be restricted to particular region or particular crops.
- Overcoming the state-wise differences in awareness levels and lacunae in MSP announcements.
- Meaningful consultation with the State Government on the methodology of computation of MSP as well as on the implementation mechanism.
- Swift payment should be ensured.
- MSP should be announced well in advance of the sowing season so as to enable the farmers to plan their crops.

The following alternatives to MSP must be considered:

- **Price Deficiency Payment**: Under this arrangement the difference between the MSP and the selling price can be compensated through direct transfer to bank accounts. This would address the problem of most of the stock being sold to the government.
- **Area planning/restrictions:** For example, in the UK, all farms above 5 hectares have to get approval for use of land for growing crops. It can check price crash due to over-production by restricting the area under a particular crop.
- **Direct Income Support:** A direct income support on the basis of cultivated acreage, as done recently in Telangana and Karnataka, also has the advantage of being less distortionary than MSP.

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PUBLIC DISTRIBUTION SYSTEM, BUFFER STOCKS AND FOOD SECURITY

Contents

Student Notes:

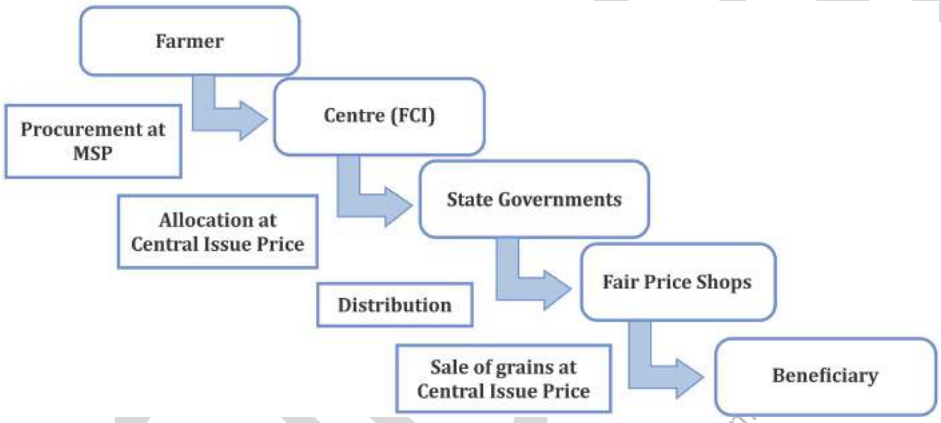
1. Public Distribution System in India

The Public distribution system (PDS) is a **food security system** established **under the Ministry of Consumer Affairs, Food, and Public Distribution.** It includes within its fold a government-sponsored chain of approximately 5.35 lakh fair price shops entrusted with the work of distributing basic food and non-food commodities to the needy sections of the society at very cheap prices.

The responsibility of operating PDS is jointly shared by the Central and the State Governments.

- The **Central Government,** through Food Corporation of India (FCI), undertakes procurement, storage, transportation and bulk allocation of food grains to the State Governments.
- Operational responsibilities like allocation within the State, identification of eligible families, issue of Ration Cards and supervision of the functioning of Fair Price Shops (FPSs) etc., lies with the **State Governments.**

Under the PDS, presently the commodities namely **wheat, rice, sugar and kerosene** are being allocated to the States/UTs for distribution. Some States/UTs also distribute additional items of mass consumption through the PDS outlets such as pulses, edible oils, iodized salt, spices, etc.



1.1. Objectives

The Public distribution System primarily evolved as a system of management of scarcity through distribution of food grains at affordable prices. However, it seeks to achieve other objectives like:

- to provide **essential consumer goods** at cheap and subsidized prices to the consumers.
- to insulate them from the **impact of rising prices** of these commodities.
- to maintain the **minimum nutritional status** of our population.
- to put an **indirect check on the open market prices** of various items.

However, it must be kept in mind that the PDS is merely **supplemental in nature.** It is not intended to make the entire requirement of any of the commodities distributed under it available to a household or section of the society. It **acts as a safety net** and attempts socialization in matter of distribution of essential commodities. PDS supply chain can be broken into three segments:

1. Procurement of food grains;
2. Storage & transportation;
3. Distribution of foodgrains.

To put simply, PDS begins when the government buys foodgrains through the Food Corporation of India (FCI) from farmers in the procurement stage and terminates when the beneficiaries receive the intended quality and quantity of foodgrains from the Fair Price Shops. It seeks to provide to the beneficiaries cereals and essential commodities like rice, wheat, sugar and

kerosene oil. However, state governments manage the system at the ground level and are exhorted to add other essential commodities like pulses, salt, candles, matchboxes, ordinary clothes, school text books/copies and the like. A number of state governments have set up Civil Supplies or Essential Commodities Corporations to buy such additional items directly from the manufacturers and use the existing structure of PDS to arrange for the sale at lower than market rates.

1.2. Context and Evolution of PDS in India

India's Public Distribution System (PDS) is the largest distribution network of its kind in the world. It was introduced around World War II as a war-time rationing measure. Prior to the 1960s, distribution through PDS was generally dependent on imports of food grains. The system was then expanded in response to the food shortages of the time. Following this, the government set up the Agriculture Prices Commission (later renamed to CACP) and the Food Corporation of India to improve domestic procurement and storage of food grains for PDS.

By the **1970s**, PDS had evolved into a universal scheme for the distribution of subsidised food. In the 1990s, the scheme was revamped to improve access of food grains to people in hilly and inaccessible areas, and to target the poor.

- **In 1992,** a **Revamped PDS (RPDS)** was launched in 1775 blocks throughout the country. This was done to strengthen & streamline the PDS and to improve its reach to poor families especially in the far-flung, hilly, remote and inaccessible areas. RPDS covered areas where special programmes like Drought Prone Area Program (DPAP), Integrated tribal development program (ITDP), Desert Development Program (DDP) were under operation and in certain Designated Hill Areas (DHA).
- **In 1997, Targeted PDS (TPDS)** was launched with special focus on the poor families. TPDS aimed to provide subsidized food and fuel to 6 crore poor families for whom 7.2 MT foodgrains was earmarked annually, through a network of ration shops. Food grains such as rice and wheat that are provided under TPDS are procured from farmers, allocated to states and delivered to the ration shop where the beneficiary buys his entitlement. The centre and states share the responsibilities of identifying the poor, procuring grains and delivering food grains to beneficiaries.
  - Over and above the TPDS allocation, **'additional allocation'** was also given periodically to the states. This transitory allocation was **to benefit APL population**. But, this allocation was issued at higher prices than the ones at BPL quota.
- In **December 2000,** the government launched **Antyodaya Anna Yojana (AAY)** to benefit the poorest of the poor people. 25kg per month per household (increased to **35kg in 2002**) was provided at the highly subsidised rate of Rs 2 per kg of wheat and Rs 3 per kg of rice. **The scheme aimed to reach one crore Antyodaya households**. The, AAY has undergone three phases of expansion and now covers 2.5 crore poorest of the poor people. In between 2003-2006, 3 expansions took place which included 1.5 crore people (38% of BPL) belonging to terminally ill, widows, senior citizens with no societal support, landless and marginal farmers, primitive tribal groups, etc have been added to AAY.
- **In 2013, National Food Security Act (NFSA)** was enacted. It introduced individual entitlement of 5 kg per person per month foodgrains to around 82 crore of population.

Table 1: Timeline of PDS: 1930s to present

Evolutionof PDS	Timeline	Details
PDS	1940s	Launched as general entitlement scheme
TPDS	1997	PDS was revamped to target poor households
Antyodaya Anna Yojana	2000	Scheme launched to target the'poorest of the poor'
PDS Control Order	2001	Government notified this Order administer TPDS
PUCL vs Union of India	2001	Ongoing case in Supreme Court contending that "right to food" is a fundamental right
National Food Security Act	2013	Act to provide legal right to food to the poor

Notwithstanding sound intentions the government has failed to deliver via PDS due to some the inherent limitations of the scheme some of which we are going to discuss in the next part

Student Notes:

1.3. Limitations of PDS in India

1. **Limited benefits to poor from PDS:** Both Rural and Urban poor have not benefited much from PDS and their dependence on the open market has been much higher than on PDS.
2. **Urban Bias:** For quite a longer period of time, PDS remained limited mostly to urban areas. Although, there has been expansion of PDS in rural areas now, but its effectiveness in terms of timely and adequate availability remains under question.
3. **The burden of food subsidy:** After inclusion of NFSA-2013, the burden of food subsidy has become huge. Also, APL category people have little to no incentives to buy from PDS, so there has been increasing stock with FCI. Other than that the procurement prices have been rising continuously due to rich farmers' lobby and issue prices are getting lower due to populist policies. All of this together are making the PDS unsustainable.
4. **Loss of Food Grain:** An estimated 61,824 tonnes of foodgrains have been damaged between 2011-12 & 2016-17. Various reasons for the damage of food grains, including pest attacks, leakages in godowns, procurement of poor quality stocks, exposure to rains, floods, and negligence on the part of the persons concerned in taking precautionary measures etc.
5. **Inefficiencies in the operations of FCI**: The economic cost of FCI food grains operation has been rising on account of increase in procurement prices and other costs (distribution cost, carrying cost, etc.) and also due to inefficiencies caused by highly centralised and bureaucratic mode of operations.
6. **PDS results in Price increases:** Due to large procurement of food grains every year by Government, the net quantities available in open market reduce. This leads to increase in Price. This dual market system i.e. PDS and Open market operates to the disadvantages of poor, especially those who are excluded from the food security system.
7. **Challenges in Delivery Mechanism:** These include challenges like card issue, Quantity and Quality Issues i.e. (35 kg/family vs 5 kg/PHH); Measurement issues; Timeliness of supply; Record maintenance; Seasonality etc.

1.4. Targeted Public Distribution System

This system has been adopted by Government of India since 1997 specifically targeting poor people. It seeks **to provide foodgrains to people Below Poverty Line at highly subsidized rate from the PDS and foodgrains to people above poverty line at much higher prices**. The identification of the poor under the scheme is done by the States. TPDS maintains universal character of PDS but has special focus on BPL. Total number of families covered under BPL and AAY is 6.52 crores. The allocated amount is 35 kg per month per household to BPL and AAY, while for APL, it will be between 15 kg to 35 kg/month/household.

1.4.1. Key Features of TPDS

1. **Targeting:** Those earning a maximum of Rs. 15,000 per annum are kept within BPL. Initially 10 kg of food grains were provided per household per month, but in 2002 the limit was revised to 35 kg/household/month.
2. **Dual Prices**: In 2000, the Central Issue Prices for the PDS to state governments was set at 50% of the economic cost of FCI for BPL families and at 100% of the economic cost for APL families. In 2001, a third price was also issued for beneficiaries of ANTYODAYA ANNA YOJANA (Rs 2/kg of wheat and Rs. 3/kg of rice per family under AAY).
3. **Central-State Control:** PDS is designed and managed by State Governments, while the Central Government allocates the foodgrains to the states. Under TPDS, the size of the BPL population and the entitlement for them is decided by the Central Government.

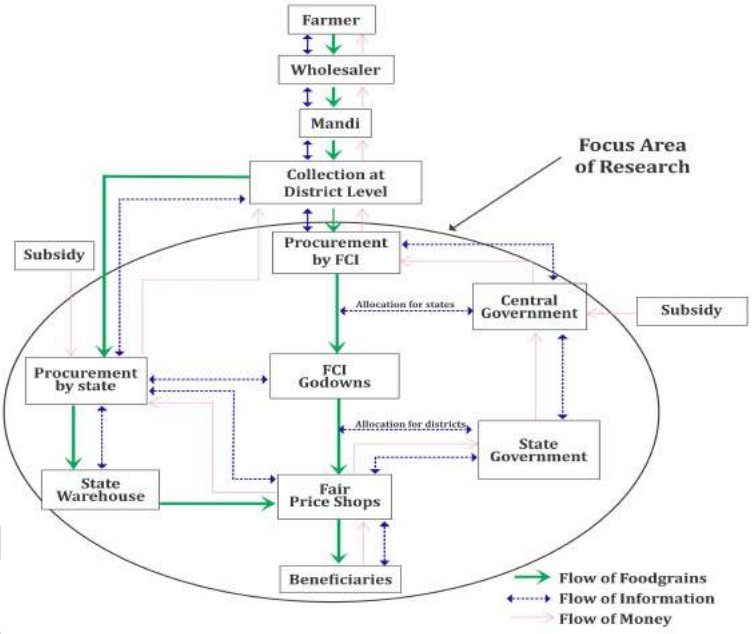
Student Notes:

Management of food grains for TPDS

The central and state governments share responsibilities in order to provide food grains to the identified beneficiaries. The Central Government procures food grains from farmers at a minimum support price (MSP) and sells it to states at central issue prices. It is responsible for transporting the grains to godowns in each state. States bear the responsibility of transporting food grains from these godowns to each fair price shop (ration shop), where the beneficiary buys the food grains at the lower central issue price. Many states further subsidise the price of food grains before selling it to beneficiaries.

The Food Corporation of India (FCI) is the nodal agency at the Centre, responsible for transporting food grains to the state godowns. More specifically, FCI is responsible for:

- procuring grains at the MSP from farmers,
- maintaining operational and buffer stocks of grains to ensure food security,
- allocating grains to states,
- distributing and transporting grains to the state depots, and
- selling the grains to states at the central issue price to be eventually passed on to the beneficiaries.

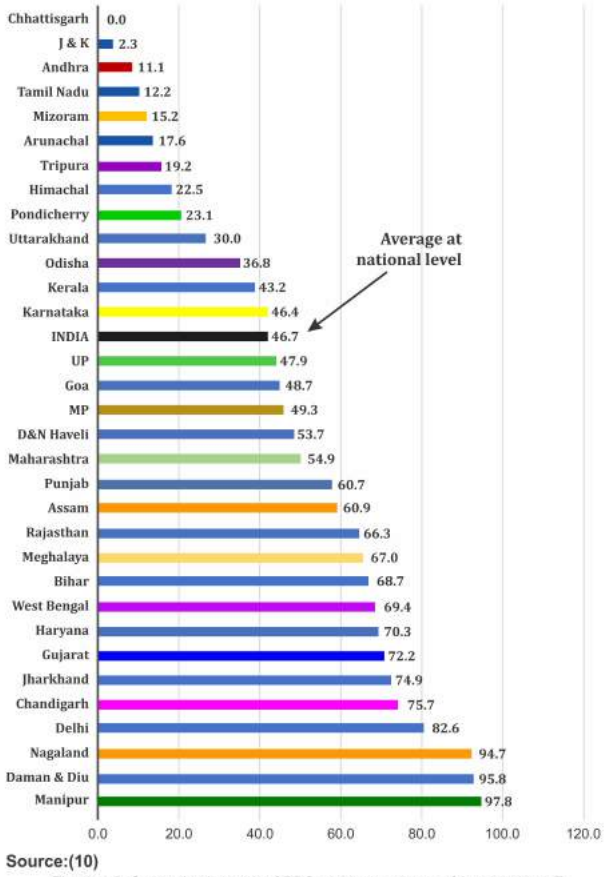


1.4.2. Issues related with TPDS

1. **Targeting:** It has both conceptual and operational issues. Conceptual issues include the problems related with **definition of eligibility for BPL status based on income poverty line** does not cover a large number of vulnerable population. Under operational issues, **Identification has been considered as the biggest challenge.** Exclusion errors are so high that 63% of the poor household were not covered by the system (NSS-2007). A high Inclusion Error is also reported as APL were having unacceptably large amount of subsidised grains. NCAER reports about **'ghost' card holders**. The Gram Panchayats and the Gram Sabhas are given responsibility of identification, but in states where these bodies are not functional, PDS dealers are seen performing the task and benefitting from it.
2. **Import Burden in case of shortfall:** According to current trends, the government procures nearly one-third of the cereals production. This is almost half of the marketed surplus of wheat and rice. In the years when production if high, procurement of this quantity of food grains is easier. However, in years of drought and domestic shortfall, India will have to resort to large scale imports of rice and wheat, exerting significant upward pressure on prices.

Student Notes:

3. **Imbalances in availability of storage capacity across states:** On the one hand, there is a shortage of space in consuming states, such as Rajasthan and Maharashtra, while on the other hand, a major portion of total storage capacity is concentrated in states undertaking large procurement such as Punjab, Haryana, Andhra Pradesh, Uttar Pradesh and Chhattisgarh.
4. **Leakages and diversion:** The major part of leakage is due to diversion of food grains to the open markets because of widespread prevalence of corruption. Transport and diversion losses also take place. There is problem of ghost beneficiaries as well. Between 1999 and 2012, leakages of food grains rose from 9% in 1999- 2000 to 36% in 2011-12. The leakage of wheat (63%) leakage is much higher than rice (47%).
5. **Late and irregular arrival of grains in fair price shop:** Lack of awareness among poor households about the exact arrival of grains at the Fair Price Shops creates the problem of physical and economic access.
6. **No variation in purchase across expenditure groups:** A successful targeting is said when there is continuous decrease in quantity purchased from PDS with increase in income.
7. **TPDS has failed in transferring cereals from surplus to deficit regions:** Prior to targeting, PDS distribution reflected demand, as it was more attractive in areas of low cereal production, low cereal consumption and high cereal prices. The policy of targeting and allocation of grain on the basis of the income poverty line has worked against the earlier objective of price stabilisation through grain movements across the country. Further, in the universal PDS, automatic stabilisation was ensured as demand for grain from fair price shops increased at a time when the gap between the PDS price and the market price rose. Again, in the new system, with APL priced out of the PDS, and BPL quotas low and fixed, the ability to undertake stabilisation has been weakened.



Source:(10)
Figure 1.3: State-wise leakage of PDS grains as percent of Annual take-off

8. **Burden of subsidy has increased:** Because of introduction of AAY and low prices for BPL, and exclusion of APL as they are not getting any incentive to buy from fair price shops (hence increasing the stock with FCI), the burden of subsidy has pushed the burden of subsidy further.

1.5. Recent PDS Reforms

1. **Digitization of ration cards:** This allows for online entry and verification of beneficiary data. Besides, online storing of monthly entitlement of beneficiaries, number of dependants, offtake of food grains by beneficiaries from FPS, etc. States of Andhra Pradesh, Gujarat, Tamil Nadu, Madhya Pradesh etc have undertaken this exercise on a large scale.

Student Notes:

2. **Linking with Adhar:** 56% of the digitised cards have been seeded with unique identification number Aadhaar. This leads to better identification and hence improved targeting.
3. **Computerisation of FPS allocation:** This makes declaration of stock balance, issuance of web-based truck challans, etc very convenient. Furthermore, it allows for quick and efficient tracking of transactions. Several states have also installed **ePOS (electronic point of sale) devices** at the fair price shops to track the sale of foodgrains to actual cardholders on a real time basis.
4. **Use of Global Positioning System (GPS) technology:** States like Chhattisgarh and Tamil Nadu use GPS technology to track movement of trucks carrying food grains from state depots to FPS. This checks leakages to a great extent.
5. **DBT:** Three UTs-Chandigarh, Puducherry and Dadra and Nagar Haveli have implemented DBT on a pilot basis.

1.6. Reforms required for revamping India's PDS

Procurement Side Reforms

- States which have gained sufficient experience (Andhra Pradesh, Chhattisgarh, Punjab, Haryana and MP) should be encouraged to procure for PDS directly from the farmers.
- FCI should focus on states which suffer from distress sale at prices much below MSP, and which are dominated by small holdings, like Eastern Uttar Pradesh, Bihar, West Bengal, Assam etc.
- Private sector should be encouraged to shoulder the responsibility of procuring, storage and distribution of PDS commodities.
- Negotiable warehouse receipt system (NWRs) should be taken up on priority and scaled up quickly.
- GoI should widen its procurement basket so as to incorporate adequate nutrient mix. It will prevent skewed incentive to wheat and rice only and promote crop diversification.
- A transparent liquidation policy is the need of hour, which should automatically kick-in when FCI is faced with surplus stocks than buffer norms.

Supply Side Reforms

- End to end computerization: Mapping of FPS and the registered customers at each FPS will help to identify exact requirements at each FPS. Timely and adequate allotment of goods at Fair Price Shops (FPS) in adequate quantities.
- Monthly declaration of sales by FPS to prevent piling up of excess inventories.
- Truck dispatch information & stock availability at FPS through SMS to registered users.
- GPS based tracking of trucks carrying PDS goods.
- FPS should be operated through Gram Panchayats, Cooperatives, Self Help Groups etc.

Consumer Side Reforms

- Proper identification of beneficiaries and creating a web database with allotted quantity of each goods as per entitlement.
- Computerized entry via AADHAAR authentication at Point of Sale (POS).
- Pilot testing of cash transfers in PDS, starting with large cities with more than 1 million population; extending it to grain surplus states, and then giving option to deficit states to opt for cash or physical grain distribution.
- Toll Free Number for complaint registration.

ONE NATION, ONE RATION CARD

As part of the Economic relief package amid COVID 19 outbreak, the Central government has announced the national rollout of a 'One Nation, One Ration Card' system in all states and Union Territories by March 2021. Under this 'One Nation, One Ration Card' system, beneficiary will be able to buy subsidized food grains from any FPS across the country using their existing/same ration card that is Aadhaar linked.

Student Notes:

Under present Public Distribution System (PDS), a ration cardholder can buy food grains only from Fair Price Shop (FPS) that has been assigned in the locality in which he/she lives. The Partha Mukhopadhyay Working Group on Migration recommended for portability of Public Distribution System and its benefits in 2017. Subsequently, Government launched Integrated Management of Public Distribution System (IM-PDS) in April 2018.

The new system will identify beneficiary through biometric authentication on electronic Point of Sale (ePoS) devices installed at FPS. Under this, a migrant will be allowed to buy maximum of 50% of family quota. This is to ensure that the individual, after shifting to another place does not buy the entire family quota in one go. Once 100 per cent of Aadhaar seeding and 100 per cent installation of ePoS devices is achieved, national portability of ration cards will become a reality. Currently, it is enabled in 17 States and UTs.

Benefits of ONORC

- Provide intra-state as well as inter-state portability of ration cards benefitting inter/intra state migrants to avail benefits.
- Inter-state portability at IMPDS portal
- Intra state at Annavitran Portal
    - Annavitran Portal has been implemented to display electronic transactions made through ePoS devices for distribution of subsidized foodgrains to beneficiaries. This portal also shows all India picture of Aadhaar authentication of beneficiaries besides allocated and distributed quantity of foodgrains up to district level.
- Helps to remove bogus ration card holders through an integrated online system.
- It can control rising food subsidy bill by preventing leakages etc.

Challenges in implementation of ONORC

- **Technological glitches**
    - **Aadhaar authentication**- Around 85.41% of ration cards have been linked to Aadhaar up until August 2019, still leaving out a significant number.
    - **e-PoS machines**- As per data on the Annavitran portal, out of total 79,050, only 37,392 FPS have e-PoS machines as of January 2020. This is further low in states like Bihar and West Bengal, with some of highest out-migration rates in India.
    - **Internet connectivity and reliability** - Internet penetration remains low in India, especially in rural India.
- **Poor quality of rural electrification**- Running E-PoS machine under new scheme requires a steady source of electrical power. Survey by Ministry of Rural Development in 2017 indicates that only half of all villages get more than 12 hours of power supply, with power failures being rampant.
- **Huge gap in data on patterns of domestic migration**- This will challenge state governments in making appropriate quantities of rationed commodities available for masses. o Unplanned distressed migration can further make it difficult to tackle problem at hand.
- **Centre state relations**- Efforts to align different state implementation policies on food security may be seen an encroachment on state subjects. This might create room for mistrust between Central and state governments and require engagement based on principles of cooperative federalism.
- **Disincentivizing provisions for local food habits and needs:** In current system, over and above central government's allocations, some states distribute additional food items such as iodised salt, spices, and pulses, among others, as per their capacity and local needs. As burden of eligible beneficiaries will be different for every state (based on in/out migration), new system may disincentivize states from diversifying diets of local people.

Conclusion

ONORC scheme has to cross multiple hurdles to be implemented successfully. Nevertheless, it has potential to achieve increased access to subsidized food by most vulnerable sections of the population. It can prove to be instrumental in bringing the country closer to achieving its Sustainable Development Goal 2 of Zero Hunger in India by 2030.

Student Notes:

1.7. Alternatives to TPDS

1. **Cash Transfers:** The high level committee chaired by **Shanta Kumar in 2015** had recommended gradual introduction of **cash transfers in PDS**, starting with large cities with more than 1 million population; extending it to grain surplus states, and then giving option to deficit states to opt for cash or physical grain distribution. DBT in the name of lady of the house, and routed it through PM Jan Dhan Yojana, and dovetailing it with the UIDAI has also been suggested. This will help in better targeting, and plugging leakages.
   With a massive proportion of bank accounts being already linked with Adhar, the case for authorities in adopting DBT with respect to public distribution system (PDS) beneficiaries becomes stronger. For instance, out the around 6.72 crore beneficiaries in Tamil Nadu, Aadhaar-linking has been done for 6.68 crore. Besides, a majority of the ration cardholders are either Pradhan Mantri Jan Dhan Yojana (PMJDY) account holders (1.05 crore PMJDY acc holders in Tamil Nadu) or recipients of subsidy on cooking gas cylinders. So they are already getting financial assistance from government agencies through their bank accounts.
2. **Food Coupons:** Beneficiaries can be given coupons instead of money, which can be used to buy food grains from any grocery store. Under this system, grains will not be given at a subsidised rate to the PDS stores. Instead, beneficiaries will use the food coupons to purchase food grains from retailers (which could be PDS stores). Retailers take these coupons to the local bank and are reimbursed with money. According to Economic Survey reports, such a system will reduce administrative costs. This can also remove the problems of procurements, diversion and black marketing of food grains.
3. **UBI:** A Universal Basic Income has also been touted as an alternative. Such an initiative imparts a sense of agency on the beneficiaries, helps them make choices on their own and also saves up on administrative costs.

1.8. Universal PDS vs. Targeted PDS

When PDS was first introduced, it was a universal entitlement scheme. In 1997, it was changed into the Targeted PDS. Unlike most states in the country, Tamil Nadu retained the Universal PDS, providing subsidised food grains to the entire population. Its PDS success story has been inspirational. However, there are both advantages and limitations to this approach:

1. Subsidised PDS commodities are distributed to all residents without classifying them into different categories. According to the Justice Wadhwa Committee Report, non-classification helps the state avoid errors of exclusion of eligible and vulnerable families.
2. A universal scheme will create an **unnecessary burden over the exchequer**, as this will have huge inclusion error because those who do not need the security, such as rich people, will get automatically included in it. But, at the same time a universal PDS will remove the exclusion error seen in targeted schemes due to misidentification of beneficiaries, rampant corruption, leakages and diversion in the PDS, etc. Some critics are of view that **a more inclusion error, but less or no exclusion error is more favourable condition** for the success of PDS. Also, rich people can be persuaded to give up their subsidy, as successfully done in LPG.
3. A high procurement of food grain will have to be done for a Universal PDS. This will **increase the price** of wheat and rice in open markets. It calls into question the ability of the government to to import such quantities of highly subsidized food grains in the event of shortfall.
4. India is home to a **large number of migrants, non-citizens etc.** A targeted PDS excludes these people as they do not have required documents for ration card. A universal PDS will bring them under the fold of food security. But both budget and grains are limited. Universal schemes implemented in North Africa suggests that it involves unnecessary high costs and no significant benefits to the poor.
5. However, universal programs **lack the element of 'affirmative action'.**

Student Notes:

Food Corporation of India (FCI)

FCI is a statutory organisation set up in 1965 under Food Corporation Act 1964. It is the main agency providing foodgrains to the PDS. Its primary duty is to undertake the **purchase, storage, movement, transport, distribution and sale of food grains and other foodstuffs**. FCI is mandated with three basic objectives:

1. to provide effective price support to the farmers, also, it ensures that the farmers are getting the announced remunerative prices and the consumers are getting food grains at the uniform price fixed by the Government.
2. to procure and supply grains to PDS for distributing subsidized staples to economically vulnerable sections of society.
3. keep a strategic reserve to stabilize market (for basic food grains).

Recommendations of High Level Committee on Restructuring of FCI

The Committee was set up in 2014, with **Shanta Kumar as Chairman**. It submitted its report in 2015.

1. **On Procurement Related Issues:**
   - FCI should hand over procurement to those States which have gained sufficient experience (Andhra Pradesh, Chhattisgarh, Punjab, Haryana and MP). It should focus on states which suffer from distress sale at prices much below MSP, and which are dominated by small holdings, like Eastern Uttar Pradesh, Bihar, West Bengal, Assam etc.
   - Negotiable warehouse receipt system (NWRs) should be taken up on priority and scaled up quickly.
   - GoI needs to revisit its MSP policy which gives skewed incentive to wheat and rice only and neglects crop diversification.
   - MSP policy should work in coordination with trade policy so that the landed costs of imported crops are not below their MSP.
2. **On PDS And NFSA Related Issues:**
   - GoI should defer implementation of NFSA in states that have not done end to end computerization; have not put the list of beneficiaries online for anyone to verify, and have not set up vigilance committees to check pilferage from PDS.
   - The current coverage of 67% Population under NFSA is a huge fiscal burden. It should be brought down to 40%.
   - Gradual introduction of cash transfers in PDS, starting with large cities with more than 1 million population; extending it to grain surplus states, and then giving option to deficit states to opt for cash or physical grain distribution.
     - Cash transfers can be indexed with overall price level to protect the amount of real income transfers.
     - Cash can be given in the name of lady of the house.
     - Cash can be routed through Prime Minister's Jan-Dhan Yojana (PMJDY) and dovetailing Aadhaar and Unique Identification (UID) number.
3. **On stocking and movement related issues:** FCI should outsource its stocking operations to the private sector.
4. **On Buffer Stocking Operations and Liquidation Policy:** the current system is extremely ad-hoc, slow and costs the nation heavily. A transparent liquidation policy is the need of hour, which should automatically kick-in when FCI is faced with surplus stocks than buffer norms.
5. **On Labour Related Issues:**
   - Increase mechanisation to reduce the number of manual labour requirements and offices.
   - At top level, hire executives from private sector
   - daily wage contractual labour or outsourcing should be done wherever possible
6. **On direct subsidy to farmers:** Farmers be given direct cash subsidy (of about Rs 7000/ha) and fertilizer sector can then be deregulated.
   - This will plug diversion of urea to non-agricultural uses, as well as to neihbouring countries.
   - This will also help raise the efficiency of fertilizer use.
   - This may also help those who take loans from money lenders at exorbitant interest rates to buy fertilizers or other inputs, thus relieving some distress in the agrarian sector.

Student Notes:

2. Buffer Stocks

2.1. Introduction

A *buffer stock* is a system or scheme which buys and stores stocks at times of good harvests to prevent prices falling below a target range (or price level), and releases stocks during bad harvests to prevent prices rising above a target range (or price level). So, it neutralizes the fluctuation in production of a given crop, so that the prices may remain stable.

In times of surplus production, government procures the crops from farmers through MSP so that the farmers do not suffer negatively for producing more. In times of deficit, government releases the buffer stocks in a phased manner so that interests of the consumers do not suffer, and they are able to meet their nutritional requirements at reasonable prices.

2.2. Buffer Stock Policy of India

The concept was introduced in the **fourth five year plan (1969-74)**, and a buffer stock of food grain was to be maintained by FCI on behalf of the Government of India to meet the monthly release of food grains **for supply through PDS** (Targeted Public Distribution System, TPDS and Other Welfare Schemes (OWS) **to meet emergency situations** arising out of unexpected calamities such as crop failure, natural disasters, etc. and **for market intervention** to augment supply in case of deficit production of food grains, so that, the open market prices get moderated.

Food grain stocking norms refers to the level of stock in the central pool that is sufficient to meet the operational requirements of food grains i.e. for distribution under Targeted Public Distribution System TPDS, Other Welfare Schemes (OWS) and exigencies at any point of time. Earlier this concept was termed as **Buffer Norms and Strategic Reserves**.

Buffer norms are fixed by CCEA (Cabinet committee on Economic Affairs chaired by PM) on quarterly basis as on 1st April, 1st July, 1st October, and 1st January of every financial year. The buffer norms have been revised in January 2015.

Operational stock = Stocks earmarked for TPDS + OWS and Food security stocks/reserves.

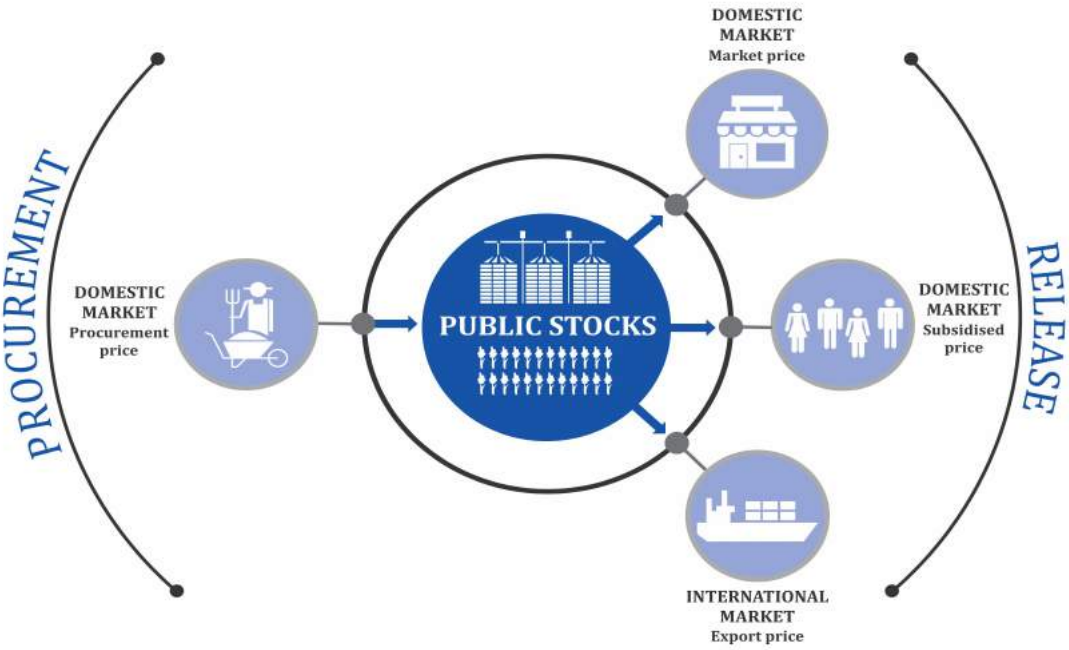
In addition to the buffer norms, **a strategic reserve** of 30 lakh tonnes of wheat and 20 lakh tonnes of rice is also maintained. This stock is termed as **Food Grain Stocking Norms.**

The Buffer norms of food grains in the central pool have been revised in 2015 and Cabinet Committee on Economic Affairs, CCEA has approved that in case the stock of food grains is more than the revised buffer norm, the Department of Food and Public Distribution will **offload excess stock in the domestic market through open sale or through exports.**

From 2015, Government has decided to create a buffer stock of 1.5 lakh tonnes of pulses to control fluctuation in their prices. NAFED, SFAC and FCI will procure pulses for buffer stock.

Food stock above the minimum buffer norms are treated as 'Excess Stock', and government can liquidate them through export, open market sales or additional allocation to states.

Student Notes:



2.3. Critical Evaluation of Buffer Stocks in India

There are several problems in operating and designing a sustainable food intervention system. From procurement to distribution, the system is handled mainly by the government (although more recently some part of the logistics have been handed over to private contractors, based on tender-auctions) and is plagued with inefficiencies. Some of the inefficiencies are given below:

1. **Open-ended procurement:** FCI has to procure a large amount of grain from market due to increasing commitment of government, and has become a buyer of last resort. For instance, in 2016-17, Government ended up procuring more than 30% of the marketable surplus of wheat**.**
2. **Procurement Prices have become Support Prices:** Procurement prices which were kept for maintaining the buffer stock has virtually become the prices for purchasing whatever amount the farmer offers for sale. Consequently in times of scarcity, farmers don't get the benefits and in case of excess production, markets are not able to function optimally so as to restore the balance between demand and supply. Besides, the quantity purchased exceeds the storing capacity of FCI and leads to excessive damage of procured grains.
3. **One tool serving many objectives:** Using the same instrument to achieve the twin objectives of ensuring remunerative price to farmers and providing the procured food grains to the poor at highly subsidized prices creates conflicts. By implication, this entails a huge gap between the purchase price and issue price, and consequently a larger subsidy bill.
4. **Inefficient Inventory management:** In the absence of clear targets for the stock level, the whole inventory management system of the FCI becomes inefficient and thus costly.
    a. First, the **FCI's inventory management policy has a counter-cyclical character**. The government should procure grain in times of abundant supplies in the market, and release it in times of scarcity. However, the need to meet the needs of the TPDS and the other food- based welfare schemes, the government not only withholds stocks during a bad crop year (because it expects off-take to be higher than normal), it also steps up its procurement, pushing up prices in an already supply-constrained market.
    b. **Inefficient Inventory management:** Even after allocating to the mandated schemes and maintaining reserves, an excess of millions of tons of grain remain in the FCI godowns.

Student Notes:

There is no pro-active, pre-defined, sustainable policy practiced for this residual grain. As a policy, such residual grain, which is of good quality, can be released through two channels.

i. It could be released in the domestic market under the open market sale scheme (OMSS)
ii. Grain can be released in the global markets through exports (depending on the prevailing export policy)

Grain of inferior quality or destroyed grain is disposed of as feed, generally at a pre-determined reserve price.

The policy towards international grain trade has been of an ad-hoc nature, with the domestic grain supply and price situation determining the export/import policy every year. Also, there have been frequent bans on grain export. While, OMSS-Domestic remains a failure because the issue prices are always kept higher and poor quality of released grains. Both, the methods have proved inadequate for disposing off the residual grain.

5. **Rising cost of Operation:** Under grain management, FCI's main heads of costs are acquisition costs, which include the pooled cost of grain and procurement incidentals, and distribution costs (these are costs involved in the allocation and distribution of grains to various states/UTs under various food- based welfare schemes). To maintain strategic stocks, FCI incurs buffer-carrying costs, which include the cost of warehousing, stock maintenance etc. and this cost of FCI is called "annual rate of buffer carrying cost". This cost has more than doubled since 2001-02. There has been rise in all the above mentioned costs due to:
   a. **Higher acquisition cost:** MSPs and Bonuses are continuously increasing. Mandi charges, milling charges, administrative charges are increasing as well. The economic costs of FCI for acquiring, storing and distributing food grains is about 40 per cent more than the procurement price.
   b. **Higher storage costs and losses due to inadequate capacity:** FCI's average annual rate of increase in storage capacity has been a meager 4.5 percent while the growth rate of rice and wheat stocks in the central pool has been more than 18 per cent. Data for the year 2011-12 show that FCI's storage and transit losses have increased by close to 147 per cent in nominal terms between 2006-2007 and 2011-2012, much of which is accounted for by a 164% increase in storage costs in the period.
6. **De-facto nationalization of the grain market:** With **more than 75 per cent of the marketable surplus procured by the government**, very little grain is available for the open market. This lower market supply exerts an upward pressure on prices in the open market, neutralizing much of the consumer benefits that the subsidy provides. Also, the Essential Commodities Act, APMC Act and state government interferences adversely affect the price competitiveness of Indian grain in the international market.
7. **Increasing gap between per capita production and per capita availability:** Although rice and wheat production rose by 29 per cent between 2000 and 2012, **per capita net availability of grains went down by close to 1 per cent**. When rising stock levels with the government reduces grain availability for consumption, it counters the whole objective of buffer stocking. The idea was to procure grain and distribute it to the needy to improve the access to and availability of grain. However, if the grain is procured, stored, and not distributed/released when needed, then it could, contrary to the objectives of the system, increase food insecurity.
8. **Inefficiencies in the targeted public distribution system:** Along with high amount of pilferage, inclusion and exclusion errors, the economic cost of operation has also increased more than 100% in last decade, while the issue price has remained constant. The huge amount of financial implication can be observed by following facts (2014)
   a. India's food subsidy bill has grown more than 25 times (in nominal terms) during the last two decades

b. it is more than one per cent of annual gross domestic product (GDP) and five per cent of the agricultural GDP
c. and is nearly one-third of all subsidies given by the central government.

3. Food Security

3.1. Introduction

The definition of food security has evolved over a period of time. As a concept, food security originated in the mid-1970s, in the wake of global food crisis. The initial focus of attention was assuring the availability and to some degree the price stability of basic foodstuffs at the international and national level. This was then broadened to incorporate the demand side of food security in early eighties. During the nineties issues such food safety, nutrition, dietary needs and food preferences were also considered important ingredients of food security.

In FAO report on 'The State of Food Insecurity, 2001' , food security is defined as a "situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life".

World Summit on Food Security stated that the "four pillars of food security" are ***availability, access, utilization, and stability*** i.e. food security over time.

To accomplish all the above criteria, requires not only an **adequate supply of food** but also **enough purchasing power capacity** with the individual or household to demand adequate level of food.

Food Security vis-a-vis Constitution of India

In the Indian context, the underpinnings for food security of the people can be found in the Constitution, though there is no explicit provision on right to food.

The fundamental right to life enshrined in Article 21 of the Constitution has been interpreted by the Supreme Court and National Human Rights Commission to include right to live with human dignity, which includes the right to food and other basic necessities.

Under Directive Principles of State Policy, it is provided under Article 47 that that the State shall regard raising the level of nutrition and the standard of living of its people and the improvement of public health as among its primary duties.

Providing food security has been focus of the Government of India's planning and policy. Attainment of self-sufficiency in foodgrains production at the national level has been one of the major achievements of the country. In order to address the issue of food security at the household level, Government is implementing the Targeted Public Distribution System under which subsidized foodgrains is provided to eligible households. To further strengthen the efforts to address the food security of the people, the Government enacted the National Food Security Act, 2013.

3.2. Qualitative and Quantitative Dimensions of Food Security

The adequate supply of food involves two dimensions:

- Quantitative Dimension or overall food availability in the economy.
- Qualitative Dimension pertaining to the fulfillment of nutritional requirements.

3.2.1. Quantitative Dimension of Food Security in India

India gained self-sufficiency in the food grains in 1970s mainly because of green revolution and has sustained it since then. India's foodgrains production is estimated at a record 291.95 million tonnes in the 2019-20 crop year. Thus, in terms of per capita food requirements, India is self-sufficient in the production of major food crops like wheat and rice.

Student Notes:

Trends in Per Capita Net Availability of Food Grain

It has remained rather stable over the years. While in 2014, it was 489 g/day, it went down to 484.3 g/day in 2018.

3.2.2. Qualitative Dimension of Food Security in India

While the per capita food availability is sufficient, food is not equally distributed. Due to anomalies in the distribution channels and disproportionate purchasing power capacity of people, the nutritional requirements of vulnerable sections are not adequately addressed.

This can be gauged from the following facts:

- According to State Of Food Security and Nutrition in The World 2020 Report of FAO, the number of undernourished people in India declined from 249.4 million in 2004-06 to 189.2 million in 2017-19.
- It further said that the prevalence of stunting in children under 5 years of age in India declined from 47.8% in 2012 to 34.7% in 2019 or from 62 million in 2012 to 40.3 million in 2019.
- It estimated that the number of adults (18 years and older) who are obese grew from 25.2 million in 2012 to 34.3 million in 2016, growing from 3.1 % to 3.9 %.
- The number of women of reproductive age (15-49) affected by anaemia grew from 165.6 million in 2012 to 175.6 million in 2016
- The number of infants 0-5 months of age exclusively breastfed grew from 11.2 million in 2012 to 13.9 million in 2019.
- Recently released NFHS-4 report also shows similar facts i.e. 53% women (15-49 years of age) and 58.4% of children (6-59 months) are anaemic and 35.7% of children (under 5) are underweight.
- The **Global Hunger Index 2020** report has placed India at 94th position among 107 countries, much behind Bangladesh, Pakistan and Nepal.

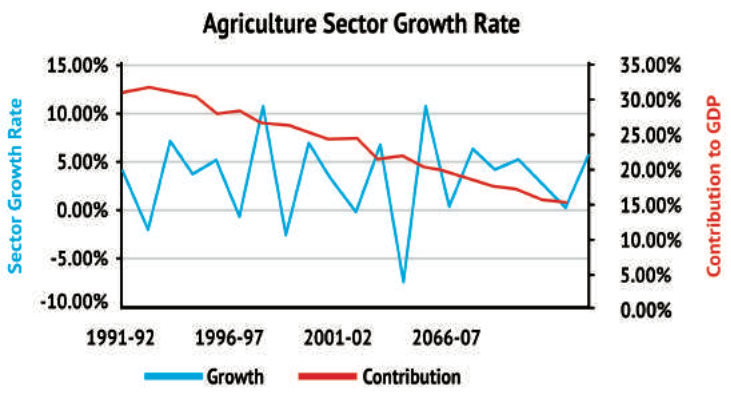
3.3. Challenges in ensuring Food Security

Over the coming decades, a changing climate, growing global population, rising food prices, poor agricultural growth rate (trends shown below) and environmental stress factors will have significant yet highly uncertain impacts on food security.

Moreover, a significant proportion of population is economically backward to be able to afford adequate food for fulfilling their dietary requirements. Despite the availability of government support programs, there have been numerous questions at international forums like WTO over government public procurement and distribution of food grains to the needy people.

To tackle the quantitative and qualitative aspect of food security problem, India provides **three food-based safety nets and one monitoring programme.**

- Public Distribution System (PDS)
- Integrated Child Development Scheme (ICDS)
- Mid-Day Meals Program (MDM)
- National Nutrition Mission (POSHAN ABHIYAAN)



Student Notes:

3.3.1. Integrated Child Development Scheme (ICDS)

A **centrally sponsored scheme** launched in 1975, it is a one of the largest child intervention programs in the world with a holistic package of **6 basic services for children up to 6 years of age**, and for pregnant and lactating mothers. These services are:

a) Supplementary feedings (Child-500 calories, 12-15gm protein for 300 days, Pregnant mothers-600 calories, and 18-20 gm protein)
b) Immunization
c) Health Checkups
d) Referral services
e) Health and nutrition education to adult women
f) Non-formal pre-school education to 3-6 years old.

3.3.2. Mid-Day Meal (MDM) Scheme

MDM is the world's largest school feeding program reaching out to about 11 crore children in Schools and Education Guarantee centres (EGS) across the country. National Program of **nutritional support to primary education**, also called MDM scheme was launched in 1995. It is a nationwide **central scheme** intended to improve:

- the enrolment and regular attendance and
- to reduce the dropouts in schools.
- to improve nutritional status of primary school children.

From 2008-09, Children from upper primary level i.e. till Class VIII were also included in the scheme. **For primary students-300 calories and 8-12 gm protein and for upper primary students-700 calories and 20 gm protein has been kept as norm**.

3.3.3. Critical Appraisal of ICDS and MDM

India's one of the biggest flagship programs, the Rs 8,000 crore-a-year Supplementary Nutrition Program (SNP) to fight child malnourishment under ICDS suffers from gross violations and misuse of rules and has failed in meeting its ends.

1. Due to **meager allocation of resources and faulty policy designs,** the overall impact of ICDS and MDM over malnutrition has remained very limited. The states with high degree of malnutrition, have **low coverage** of both the schemes.
2. Poor quality of **nutrient deficient meal** is being served at most of the schools.
3. ICDS has limited itself with just one function of Supplementary Nutritional Program (SNP) and is not concerned about other functions. Also, it focuses on children 3-6 years of age, so, 0-3 years (when maximum nutrition is required) old suffer neglect.
4. Since food is nutrition deficient in ICDS as well, children are facing the problem of **hidden hunger** i.e. prevalence of Iodine, calcium, iron or Vitamin A deficiency.
5. Child Immunization and pre-school education is neglected under ICDS, except in Tamil Nadu (FOCUS report).
6. ICDS is poorly implemented. Also, several posts such as of CDPO and supervisors remain vacant in many states.
7. Rampant corruption, fudged records and bland panjiri has become the reality of ICDS. FOCUS reports (Focus on Children Under Six Report by Right To Food Campaign NGO) show that c**orruption is the main reason for failure** of ICDS and MDM in removing malnutrition. It was found that 'panjiri' (ready-to-eat energy mix) meant for children is being used illegally to feed the cattle of rich and influential in Uttar Pradesh.
8. MDM is **falling prey to private contractors**. Also, political leaders and influential business people have formed SHGs and mahila mandals to gain such contracts.

Student Notes:

3.3.4. National Nutrition Mission

It is a flagship programme which would be executed with the Ministry of Women and Child Development (WCD) as the nodal ministry along with other ministries like Ministry of Drinking Water and Sanitation, Ministry of Health and Family Welfare etc. which ensures convergence with various programmes.

Target: The mission, to be implemented in three phases, has a target to reduce stunting, undernutrition, and low birth weight by 2 per cent per annum, and anaemia among children (of 6-59 months) and women/adolescent girls (15-49 years) by 3 per cent annually. It would also strive to achieve reduction in stunting from 38.4% (NFHS-4) to 25% by 2022 (Mission 25 by 2022).

Salient Features: The salient features of India's National Nutritional Mission include the following:

- NNM as an apex body will monitor, supervise, fix targets and guide the nutrition related interventions through the life cycle concept.
- Mapping of various schemes contributing under malnutrition
- ICT (Information and Communication Technology) based real time monitoring system.
- Incentivizing states/UTs for meeting targets
- Incentivizing Anganwadi Workers (AWW) for using IT based tools and eliminating the need for registers
- Measurement of height of children at Anganwadi Centres
- Social Audits to track the health progress of the children
- Setting-up Nutrition Resource Centres

3.4. National Food Security Act, 2013

It marks a paradigm shift in approach to food security – from a welfare to rights based approach. The Act legally entitles up to 75% of the rural population and 50% of the urban population to receive subsidized foodgrains under Targeted Public Distribution System. About 67% of the total population therefore is covered under the Act to receive highly subsidized foodgrains.

The Act seeks to provide food and nutritional security in human life cycle approach, by **ensuring access to adequate quantity of quality food at affordable prices to people to live a life with dignity** and for matter connected therewith or incidental to it. The Act brings the **Right to Food** within the framework of legally mandated entitlements.

3.4.1. Key Features of the Act

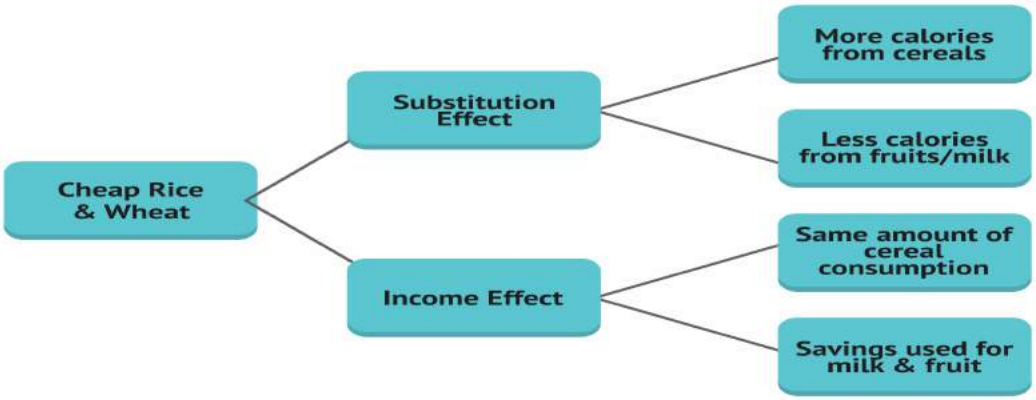
1. It entitles 75% of the rural population and 50% of the urban population (**67% of the population i.e. 80 crore people**) for subsidized grain under TPDS.
2. The act provides **'individual entitlement'** and each **individual will be provided 5 kg** of wheat, rice or coarse cereals a month at the rate of Rs 3, Rs 2, and Re 1 per kg respectively. These Prices may be changed by the Central Government from time to time, but after 3 years of the act only and not above the MSP.
3. 2.43 crore people under **AAY will get 35 kg food grain** per household per month, like earlier.
4. There is a **special focus on nutritional support to pregnant women and lactating mothers and children up to 14 years of age** by entitling them to nutritious meals. Pregnant women will also be entitled to receive cash maternity benefit of Rs. 6,000 in order to partly compensate her for the wage loss during the period of pregnancy and also to supplement nutrition.

Student Notes:

5. The act contains an important provision for **women empowerment by giving status of head of the household to the eldest woman of the household**, for the purpose of issuing of ration cards.
6. State Governments have been given responsibilities to identify the households within 365 days of the passage of the act.
7. For children below 6 months, **exclusive breast feeding** is to be promoted. For children between 6 month to 6 years, **age-appropriate free meals** will be provided by the Aanganwadi Centres. For children between 6-14 years of age (unto Class VIII) will be given **Mid Day Meal** at public schools.
8. Every pregnant and lactating mother will get free meal at local aanganwadi (till 6 months of delivery) and a **maternity benefit of Rs 6000** in instalments.
9. A **State Food Commission** will be set with a chairperson, five members and 1 secretary (including at least 2 women, and 1 member each from the SC and ST community)
10. If concerned state government is not able to provide the food grain, then **equivalent food security allowance** has to be provided.
11. Act includes three schedules:
    a. **Schedule 1** prescribes issue prices for the PDS.
    b. **Schedule 2** prescribes nutritional standards for MDM, take home rations and related entitlements.
    c. **Schedule 3** lists various provisions to advance food security under 3 broad headings:
        - revitalisation of agriculture (land reform, R&D, etc.)
        - procurement, storage and movement of food grains, and
        - other provisions (safe drinking water, sanitation, healthcare, adequate pensions for vulnerable, etc.)

3.4.2. Food Security & Nutritional Security

The National Food Security Act primarily focuses on providing food security via expansion of the PDS. However, the extent to which this would lead to nutritional security depends on the manner in which households respond to the availability of cheap cereals.



Effect of Cereal Subsidies:

Households keep o balancing their needs like ensuring adequate calorific consumption, enhancing the quality of their diets, improving living conditions and investing in the health and education of household members. Cereal subsidies are thought to have two kinds of effects:

- **Income Effect:** For those households that value dietary diversity, being able to buy cheap cereals will free up money to purchase other foods such as milk, fruits, nuts, and perhaps eggs and meat.
- **Substitution Effect:** For households that have other dominating consumption needs, money saved by purchasing subsidised cereals may be devoted to those needs and diverted from food expenditure (substitution effect).

Student Notes:

The issue of dietary diversity has received little attention in Indian policy discourse until recently. This issue deserves considerable attention especially as India approaches an epidemiological transition withthe increasing incidence of non-communicable diseases (NCDs). Although communicable diseases remain dominant in the country, the prevalence of NCDs is rising. Cardiovascular diseases, strokes, diabetes, and cancer are the four leading NCDs in India. India has the highest number of people with diabetes in the world and this burden has been rising over time, which is why it is often referred to as the 'diabetic capital of the world'.

Some part of this increase in the occurrence of the disease can be attributed to the rising consumption of processed foods and refined foodgrains as unprocessed foods and healthier cereals like small millets are considered inferior foods that households abandon as they get rich. However, increasing incomes have not led to improving diets. Thus, it is important to examine the extent to which the availability of subsidised cereals affects dietary diversity

3.4.2.1. Role of TPDS in shaping Household & Nutritional Security in India

The National Food Security Act focuses on providing food security via expansion of the PDS. Greater access to subsidised grains for the poor was expected to reduce malnutrition, leading to a concomitant fall in the number of underweight children. However, most national level surveys conducted during this period including the National Family Health Survey-4 did not find any correlation between PDS use and decline in malnutrition.

Another expectation which has been belied is that with a rise in incomes, households would increasingly buy higher quality grains from the market rather than the PDS shops. Rather than declining, PDS use has risen sharply in both urban and rural areas for the poor as well as the non-poor. These trends have been covered in detail below.

3.4.2.2. Coverage of TPDS

- The number of households that do not own any card declined from 19 per cent to 14 per cent of the total households between 2004-05 and 2011-12. The proportion of households holding Below Poverty Line (BPL) or Antyodaya Anna Yojana (AAY) cards increased from 36 per cent of all households to 42 per cent between 2004-05 and 2011-12. Much of this increase comes from expansion of the AAY programme.
- Although BPL and AAY card holders come from the poorer sections of the society, this correlation is not perfect. The use of the consumption-based poverty line cut-off suggested by the Tendulkar Committee indicates that only 29 per cent of the BPL cardholders are poor while 71 per cent are not poor. In contrast, about 13 per cent of the APL cardholders are poor while 87 per cent are not poor. Thus, many non-poor have BPL cards while some of the poor are excluded from the ownership of BPL cards.
- The access of the poor to AAY/BPL cards has improved because of the issuance of more cards. However, the access of the rich has also improved because the programme has failed in efficient targeting and an increased proportion of cards have been distributed to the whole population.

3.4.2.3. Access and Use of the TPDS

- There was a striking rise in PDS use between 2004-05 and 2011-12. In 2011-12, about 27 per cent of all households purchased cereals from the PDS whereas by 2011-12, this proportion had risen to 52.3 per cent.
- Every category of cardholders has recorded a growth in PDS use during the period under study. While almost all the BPL and AAY cardholders are seen to purchase PDS grains, as many as 32 per cent of the Above Poverty Line (APL) cardholders also use the PDS.
- Despite the increase in the use of PDS by the purchasing households, the amount of purchase or the share of PDS grain to the total grain consumed has remained more or less stable.

Student Notes:

- PDS use increased not just for food grains but also for kerosene, with 79 per cent of the PDS card holders purchasing kerosene from PDS shops. Although the use of kerosene as a primary cooking fuel is negligible, nearly 28 per cent of the households use kerosene in conjunction with biomass (e.g. firewood) and LPG.

3.4.2.4. Role of BPL/AAY Subsidies in Shaping Food Expenditure

- There are significant differences between consumption patterns of households with BPL/AAY cards and those not having access to these cards. Studies have shown that at any given income level, households with BPL/AAY cards are more likely to buy cereals from PDS shops than those with APL cards. Since only BPL cardholders are eligible for subsidised cereals, this is not surprising.
- The expenditure incurred on food by households with BPL/AAY cards is less than the corresponding expenditure incurred by those who do not have these cards.
- Households with BPL/AAY cards invariably try to obtain their caloric needs from cheaper cereals rather than from more expensive items like dairy, fruits, nuts and meats. Rising incomes lead to greater dietary diversification for households without BPL cards than those with BPL cards.
- Food expenditure and food consumption vary between households that experience income growth vis-à-vis those that experience income declines.
- Regardless of access to PDS, food expenditure among households that suffer economic distress does not change substantially. It could be because they economise in other areas. However, food expenditure for households experiencing income growth increases.
- Growth in incomes leads to a higher increase in food expenditure by households without BPL/AAY cards than for those with these cards.
- While all households experiencing substantial income growth increase their cereal consumption, this increase is lower for households without BPL/AAY cards as compared to those with these cards.

Rising income is more likely to increase milk consumption in households without BPL/AAY cards than in those with these cards, suggesting that higher incomes coupled with the absence of subsidies on cereals lead to greater dietary diversification.

3.5. Pilot scheme on fortification of rice and its dispersal through Public Distribution System (PDS)

Department of Food and Public Distribution under the Ministry of Consumer Affairs recently approved a centrally-sponsored pilot scheme on fortification of rice and its dispersal through Public Distribution System (PDS). Financial assistance of up to 90 per cent in case of North-Eastern, Hilly and Island States and up to 75 percent in case of rest of the States has been extended by GOI. Government of India has also advised all states and UTs especially those states and UTs, which are distributing wheat flour through PDS, to distribute fortified wheat flour through PDS.

3.5.1. Defining food fortification

Food fortification is the **deliberate addition of one or more micronutrients** to food so as to correct or prevent a deficiency and provide a health benefit. These nutrients may or may not have been originally present in the food before processing. Food fortification is a "complementary strategy" and not a replacement of a balanced & diversified diet to address malnutrition.

It has the following benefits:

- Can improve the health of a **large section of the population**, all at once since the nutrients are added to staple foods that are widely consumed.

- **is safe method** of improving nutrition among people as the quantity added is very small and well regulated as per prescribed standards.
- **is a socio-culturally acceptable way** to deliver nutrients to people as it does not require any changes in food habits and patterns of people and does not alter the characteristics of the food—the taste, the feel, the look.
- **is cost effective and delivers quick results.** The **Copenhagen Consensus** estimates that every 1 Rupee spent on fortification results in 9 Rupees in benefits to the economy.

3.5.2. Need for food fortification

Nearly 70% of people in India consume less than half of their recommended dietary allowance (RDA) of micronutrients. The deficiency of micronutrients is also known as "hidden hunger" and leads to various diseases like Night Blindness, Goitre, Anaemia and various birth defects.

According to the National Family Health Survey (NFHS-4):

- 58.4 percent of children (6-59 months) are anaemic.
- 53.1 percent women in the reproductive age gro up are anaemic.
- 35.7 percent of children under 5 are underweight. Around 50-70% of these birth defects are preventable, caused due to deficiency of Folic Acid.

3.5.3. Challenges to food fortification

- **Voluntary nature:** Fortification continues to be voluntary rather than mandatory leading to limited efforts to fortify by state governments and private sector.
- **Poor implementation by states:** Although some states have adopted fortification in ICDS, MDMS and PDS, but due to lack of definitive policy guidelines, budgetary constraints, technical knowledge and logistic support, states have not adopted fortification in a holistic manner.
- **Weaknesses of FSSAI:** It lacks resources and manpower to effectively carry out its mandate.
- **Lack of awareness:** There is a lot of misinformation and ignorance about the usage and benefits of fortified food as of now.

3.5.3.1. Way Forward

- A fortification initiative will combat high malnutrition, promote food processing industry and also improve customer satisfaction. Therefore the government must reform its institutional structure and its overall implementation to mainstream this key initiative.

3.6. WTO and Food Security

According to WTO, people are considered **food secure** when they have **access to sufficient, safe, nutritious food to maintain a healthy and active life**. Public Stockholding is a policy instrument used by a Government to procurement, stock and distribute the food whenever the need arises. Minimum Support Price (MSP) is one of the instruments of Public Stockholding.

Stockpiling and distributing food are considered legitimate policy objectives and are hence permitted under WTO Rules. However, purchasing of food at fixed prices or "administered" prices which are higher than market is considered an act of subsidizing. This kind of support for purchasing food at fixed price is counted towards the Country's overall ceiling on trade-distorting support under the WTO Rules.

Currently, there is cap of 10% (fixed subsidy) for procurement of food from farmers in order to feed the needy and the poor. This cap can constrain procurement of food grains and also implementation of food aid programs in developing countries. As per the Agreement on Agriculture (AoA) of WTO, purchase of farm produce at higher prices than the market is considered as subsidizing the farmers.

Student Notes:

The methodology that is used for subsidy calculation is based on price index of 1986-1988 and that does not take into consideration the inflation. The WTO has a provision that Member countries may give subsidy in order to maintain the local market. For example, Agreement on Agriculture (AoA) excludes certain policies from reduction commitments (Green Box).

Public Distribution programs of developing countries are included in the trade distorting Amber box measures which requires reduction in the commitments. G33 Countries (a group of 47 nations) of which India is a prominent member, are demanding that the programs for food security measures should be exempted from subsidy reduction commitment of WTO. These food security measures, Public Stockholding programs should be removed from amber box to green box subsidies which are exempted from reduction commitments.

However, there is strong opposition from US, EU and such other developed countries to provide unrestrained or unlimited market price support under the banner of Food Security Measures or Public Stockholding.

- **At 2013 Bali Ministerial Conference**, ministers agreed that on an interim basis, public stockholding programmes would not be challenged legally even if a country's agreed limits for trade-distorting domestic support were breached, subject to certain safeguards. They also agreed to negotiate a permanent solution to this issue by the end of 2017 (**Peace Clause)**.
- At present such subsidies are classified as trade distorting and **capped at 10% of production value** (for developing countries).
- The safeguards include several tough conditions such as these subsidies must not affect the food security of other countries and world prices, information has to be shared, etc.
- At **2015 Nairobi Ministerial Conference**, the resolution was reaffirmed that the members must take all concerted efforts to agree on a permanent solution.

3.6.1. Recent debates in WTO meets over Food Security

India's position

India has been repeatedly demanding permanent legal solution to this problem. India has agreed to WTO's Trade Facilitation Agreement on a promise that the public stockholding issue shall be resolved. There has to be a workable solution to the issue of public stockholding issue which is better than mere peace clause.

A proposal by India and China has called on developed countries to eliminate their "amber box" support with an argument that this type of support would remove one of the biggest imbalances in the current farm trade rules by obliging the biggest subsidizers to reduce their special entitlements.

India's Public Stockholding Program under the National Food Security Act (NFSA) is much more than a mere welfare program. India is being accused of giving high price to the procurement as compared to the market price. However, in fact, the procurement prices are not always higher than the market prices. Farmers generally sell their produce to the Government because of the stability of the prices.

In a nutshell, following are India's demands:

- to find out a permanent solution for its public stockholding programmes for food security.
- special safeguard mechanism for millions of farmers from unforeseen surges in agricultural imports.
- an agreement for removing bottlenecks for facilitating trade in services.

The G-33 Coalition of developing countries led by Indonesia in 2014 and 2015 had offered several options to reach a permanent solution, such as to:

- include these 'support programmes' for food security under Green Box which is exempted from any subsidy reduction commitments.
- modify the rules to address the historical inequities in the existing WTO's Agreement on Agriculture.
- G-33 countries also want that **"traditional staple food crop"** term used in Bali decision be replaced by **"foodstuffs"** to cover all food crops.

The above two proposals (inclusion in Green Box, and addressing historical inequalities) have been **defied by US, EU, Canada, Australia, Brazil, Thailand, Pakistan,** etc. They argue that inclusion in green box:

- will amount to a **carte blanche** i.e. unrestricted power to act on one's own discretion,
- would lead to unsustainable production; and
- the permanent solution must be based on the Bali agreement, which affirms that such programmes lead to distortion.

WTO 11th Ministerial Conference at Buenos Aires in December, 2017 ended in a stalemate with no permanent solution.

4. Previous Year UPSC Questions

1. Food Security Bill is expected to eliminate hunger and malnutrition in India. Critically discuss various apprehensions in its effective implementation along with the concerns it has generated in WTO. (2013)

5. Vision IAS GS Mains Test Series Questions

1. Buffer stocking of food grains is seen as a vehicle to deliver strategic food and agricultural domestic support policies, however, there is a growing consensus that the programme has been not just costly but also imprudently wasteful. Critically evaluate.

Approach:

- Briefly discuss the government's program of buffer stocking of food grains.
- Critically evaluate by analysing its success as well as shortcomings.
- Suggest reforms for the same.

Answer:

The buffer stocking of food grains ensure that there exists sufficient food grains to meet the operational requirement of food grains and exigencies at any point of time. The operational requirement includes monthly distributions under TPDS and other welfare schemes, while exigencies include situations like a shortfall in production, natural calamity, inflation etc. The Food Corporation of India is the main agency for procurement, storage and distribution of food grains in India.

The benefits of maintaining buffer stocks have been immense:

- Provides an effective price support to farmers.
- Meets social objective of distributing subsidized food grains to economically vulnerable sections of society.
- Acts as reserve to stabilize markets for basic food grains.
- Crucial for nutritional security and for implementing the National Food Security Act 2013.

But, the execution of this program may be criticized on several grounds:

- The procurement and storage of such large quantities of stocks has high cost implications. The FCI has been carrying buffer stocks in excess of buffer stocking

Student Notes:

norms. The underlying reasons as highlighted by Shanta Kumar committee include export bans, open ended procurement with distortions and absence of pro-active liquidation policy for excess stock.

- Since the storage is not commensurate with procurement, there is high degree of wastage due to climatic conditions, pest attacks, degradation, etc.
- Crowding out of private trade from the market. This has impacted prices in the open market in an adverse manner.
- The benefits of procurement have not gone to larger number of farmers beyond a few states. Only 6 percent of farmers could sell their produce to agencies.
- A high degree of regulation of grain markets by the government has led to huge wastage at very high costs.
- Diversions of grains from PDS amounted to 46.7 percent in 2011-12 (based on calculations of off take from central pool and NSSO's (68th round) consumption data from PDS)
- Despite having buffer stocks in much excess of stocking norms, this system has failed to remove malnutrition, and bring stability in food grain prices.
- It has caused imbalances in the national production basket where pulses crop has become secondary choices for farmers.
- Various reforms to improving buffer stock operations include:
- A transparent liquidation policy is the need of hour, which should automatically kick-in when FCI is faced with surplus stocks over the buffer norms.
- Need to provide greater flexibility to FCI with business orientation to operate in Open Market Sale Scheme(OMSS) and export markets.
- FCI should outsource its stocking operations to various agencies such as Central Warehousing Corporation, State Warehousing Corporation, and even state governments that are building silos through private sector on state lands (as in Madhya Pradesh). It should be done on competitive bidding basis, inviting various stakeholders and creating competition to bring down costs of storage.
- India needs more bulk handling facilities and better mechanization in handling buffer stocks. For example, Silo bag technology and conventional storages where ever possible should replace 'Cover and Plinth (CAP)' storage, promoting gradual containerization to reduce transition loss and improve turn-around-time etc.

2. Financial support to farmers through various instruments has been a crucial aspect of agricultural policy of the government. Examine whether the proposal of moving towards direct transfer of benefits and universal crop insurance would alleviate the existing concerns in the current scenario.

Approach:

- In the introduction, explain the current financial support to the farmers, as highlighted by the given statement.
- Discuss the issues with current instruments of financial support and measures needed to address them.
- Provide a solution oriented conclusion.

Answer:

To address the financial problem of farmers government came up with schemes like Interest Subvention Scheme, loan waiver, MSP and subsidies in different sectors (fertilizer, electricity etc.). However, there are certain issues with respect to economy and efficiency of such approaches For example, it is seen that at least 30 to 40 per cent of crop loans under the interest subvention scheme is getting diverted to non-agricultural uses. Under these circumstances the need for moving towards direct transfer of benefits and Universal crop insurance has been felt.

Student Notes:

Direct Transfer

Benefits

- Reduce leakages, which currently hover around 30 to 40 per cent.
- Will promote equity as a subsidy package can be designed on a per-hectare basis, with smaller landholders getting a higher per-hectare rate.
- Convergence: Directly transferred money to farmers' accounts linked to Aadhaar for all input subsidies like fertilizers, seeds, farm machinery and credit, will give them freedom to choose the right mix of inputs at market prices.
- Address market distortions: Transferring input subsidies to farmers' accounts will let the markets for inputs be freed.
- Post-harvest losses will also be covered and Time Bound Payment of Losses will prevent delays and further worsening of Farmers' Distress.

Challenges

- Issue of upfront payment: not all farmers can pay market prices for say, fertilisers and wait for the subsidy to be credited to their bank accounts.
- Exclusion of sharecroppers by virtue of their not 'owning' land.
- Inadequate penetration of banking services.

Crop Insurance Scheme

Currently crop insurance scheme has limited penetration due multiple conditionalities, in terms of season, crop etc. Moreover, due to significantly high premium rate, insurance coverage is very less. Therefore, it is argued that Universal Crop Insurance Scheme should be launched.

Benefits

- Increased penetration: It would increase the coverage of insurance scheme.
- Financial security: This would ensure financial security to distressed farmers, reducing farmer suicide.
- Formalise agriculture: With increased penetration of insurance in farming sector, a beginning can be made towards the formalization and taxation of agriculture.

Challenges

- Universal crop insurance scheme would need huge financial resources.
- Universal crop insurance without matching extension services might encourage farmers to take unsustainable risks, thereby making insurance unviable.

Way forward

Steps such as PM Fasal Bima Yojana, changes in land leasing laws (which allow formal recognition of non-landowning cultivators) are the moves in good direction and could offer solution. Thus, both direct transfer of benefits and Universal Crop Insurance, if applied creatively and equitably, have the potential to alleviate the current concerns and leakages.

3. Even though India's Public Distribution System (PDS) has produced multiple success stories in the past decade, imposition of Aadhaar-based biometric authentication threatens to disrupt the progress achieved thus far. Comment.

Approach:

- In the introduction point out the success stories of states like Chhattisgarh in making PDS effective.

Student Notes:

- Discuss the new Aadhaar based biometric technology and how it is disrupting the progress made by earlier PDS reforms.
- Give suggestions to deal with challenges produced by introduction of the new technology and how they can be overcome.

Answer:

Public Distribution System (PDS) was started with the objective of providing food security to all citizens. In the last decades, as in Chhattisgarh and other states demonstrated that PDS system can be made effective and free of ailments of leakages and corruption by:

- broad coverage,
- clear entitlements,
- de-privatisation of PDS shops,
- computerisation

Survey data reflects that this system was working reasonably well for BPL households: on average, they were receiving 84 per cent of their food grain entitlements from the PDS.

In recent years the goals of NFSA 2013 have been envisaged to be achieved by Aadhaar based biometric authentication in the TDPS system.

Despite multiple advantages of this system, many argue that government's push for Aadhaar based biometric authentication in the PDS is obstructing the progress achieved so far for following reasons:

- It requires multiple fragile technologies to work at the same time: **the PoS machine, the biometrics, the Internet connection, remote servers, and often other elements such as the local mobile network.**
- Further, it requires at least some household members to have an Aadhaar number, correctly seeded in the PDS database. As biometrics data cannot be downloaded so internet dependence is inherent for Aaadhar. Lack of internet connectivity in poorer states make it as inappropriate technology.
- Failing internet connection alternative mechanisms such as maintaining registers is fraught with confusion and lack of transparency.
- Biometric identification is not infallible and is prone to non correctable errors (for example finger prints of manual labours with cuts and bruises is a source of error). This may lead to exclusion of genuine candidates.

Nonetheless, Aadhaar based biometric authentication can be a potent tool for the government, in making the PDS more effective across following identified areas:

- Reducing leakages,
- Clear identification of beneficiaries,
- Portability in identification,
- Aadhaar based authentication at the delivery point (BAPU),
- Aadhaar-based authentication to track food grain movement etc:

For this to happen following steps can be taken:

- Not making Aadhar mandatory, as also observed by the Supreme Court, till a satisfactory system is evolved.
- Employing end-to-end technology solution such as the one developed by Bosh with mobile devices for the digitization of the PDS. It would do away technological limitations of existing PoS system. Adopting a flexible system that is easily customizable as each State has its own different requirements for PDS supplies. .

Student Notes:

- In case there is no data connectivity, there should be option of offline mode as well, wherein the credentials of the buyer are captured and verified locally, and later synced with the back-end when connectivity is established.

4. What are the issues in effective implementation of Targeted Public Distribution System (TPDS) in India? Do you think direct benefit transfer as an alternative to TPDS is a viable solution to attain food security?

Approach:

- Briefly explain the existing Targeted Public Delivery System (TPDS) of food grains in India.
- State the issues that hinder effective implementation of TPDS.
- Analyze if the DBT system is a viable alternative to TPDS to attain food security.

Answer:

The TPDS operates through a multi-level process in which the Centre procures food grains from farmers at MSP and allocates them to states. State governments identify eligible households and deliver food grains from depots to ration shops. The National Food Security Act, 2013, modified the TPDS programme from a welfare approach to a rights-based approach of social protection.

The issues in effective implementation of TPDS include:

- Inaccurate identification of beneficiaries: As per a report by NITI Aayog, only 29% of BPL cardholders and 13% of APL card holders are poor based on Tendulkar committee poverty line.
- Leakage and diversion of subsidized food grains during transportation to the ration shop and from the ration shop into the open market.
- Most of the procurement occurs in few surplus states and that too mostly from large farmers, whereas distribution is done throughout the country. This leads to a situation where grains have to be moved large distances (e.g. between Punjab and North-east states), leading to increased costs and wastages.
- Overall procurement incidentals (costs incurred in procurement and storage) are also high.
- CAG audit revealed shortfall in government's storage capacity and imbalance regarding storage capacity across regions.
- Wastage of food grains due to lack of cold storage facilities.
- Shanta Kumar Committee report revealed inefficiency and corruption in the system.
- The amount slated for procurement is expected to increase under NFSA, raising concerns regarding its sustainability. It also results in rising cost of food grains in open market.

DBT, through JAM trinity, has been successfully implemented for income transfers like widows' pensions, scholarships, LPG subsidy like PAHAL etc. Similarly, DBT for food subsidy could minimize the problem of exclusion of poor consumers and make targeting beneficiaries easier by removing intermediaries. It would also enable the dismantling of an elaborate PDS system, with consequent prevention of leakage and saving of huge costs.

Challenges of DBT for food subsidy

- It generates a new dependence on the banking system, which has limited coverage in terms of region and beneficiaries.
- DBT for food carries the risk of diversion of subsidy for non-food uses.

Student Notes:

- DBT for food is not linked to inflation, thereby making food beyond affordability during high prices.
- MSP as remunerative prices for farmers is inseparable part of TPDS which stands denied in case of DBT.

Well researched choice based DBT where beneficiaries can choose if they would prefer to avail cash DBT in lieu of in kind benefits through PDS may be a feasible solution.

5. Highlighting the objectives of Public Distribution System in India, discuss the issues associated with it. Also, critically discuss the role technology can play in addressing these issues.

Approach:

- In the introduction, briefly write about the PDS.
- Discuss its objectives and associated issues.
- Highlight the benefits of technology to PDS.
- Discuss the issues in using technology in PDS.

Answer:

Public distribution system is a government-sponsored chain of shops entrusted with the work of distributing basic food and non-food commodities to the needy sections of the society at very cheap prices. Wheat, rice, kerosene, sugar, etc. are a few major commodities distributed by the public distribution system. India has one of the biggest public distribution system in the world. It satisfies the following objectives:

- PDS aims at providing essential commodities at affordable prices to the low-income sections of the society.
- It also caters to bring about the distributive justice in the society.
- PDS plays a role of buffer between the downtrodden and price uncertainties of the free market.
- It aims at removing poverty, malnutrition and hunger and thus improving health and standards of living of citizens at lower development pyramid.

PDS system has often been blamed for high inefficiency, leakages and rural-urban bias. It faces the following issues:

- Identification of beneficiaries has not been uniform and standardized.
- Due to corruption, economically well-off people get registered as beneficiaries.
- PDS is suffering with the problem of leakage.
- PDS commodities are often replaced with low quality commodities.
- High level of buffer stocks often leads to wastage of food grains and deterioration in quality.

Technology has the potential to solve many of the issues of PDS such as:

- Technology enables the direct benefit transfer of benefits in the bank account of beneficiaries. It empowers the beneficiaries to execute the economic decisions in the free market. In the face of competition from free market, public distribution system also gets improved.
- Aadhaar enabled authentication of beneficiaries can help curb the duplication of beneficiaries. Thus, removing the misuse of subsidy and improving the PDS supply chain efficiency.
- GPS tracking of stocks, SMS alerts to beneficiaries, CCTV monitoring of fare price shops, etc. can improve the general efficiency and monitoring of PDS.

Student Notes:

However, technology can not be a panacea for all ills in PDS. Digital divide and digital illiteracy make beneficiaries vulnerable. The inaccuracy of biometrics and Aadhar authentication leave no choice for beneficiaries. The lack of and low speed of internet connectivity in far flung regions of India make technological solution of PDS a hindrance in providing benefits to beneficiaries.

6. Identify the maladies affecting the proper functioning of the Targeted Public Distribution System (TPDS). Comment on the feasibility of alternatives available to TPDS.

Approach:

- Briefly explain TPDS in the introduction.
- Bring out the issues that hinder proper functioning of the Targeted Public Distribution System (TPDS).
- Discuss the feasibility of alternatives available to TPDS.
- Suggest a way forward.

Answer:

Launched in 1997, TDPS aims to provide subsidised food and fuel to the poor through a network of ration shops. Food grains such as rice and wheat are procured from farmers, allocated to states and delivered to the ration shop where the beneficiary buys his entitlement. The National Food Security Act 2013 relies on existing TPDS to deliver food grains as legal entitlements to poor households.

Maladies affecting TPDS

- **Identification of beneficiaries:** TDPS is prone to inclusion and exclusion errors resulting in entitled beneficiaries not getting food grains while those ineligible are getting undue benefits.
- **Ghost Cards** are made for non-existent people. This indicates grains are diverted from deserving households into the open market
- **Large Procurement:** As 75% of the population is eligible, government has to procure food grains in large amounts. In the years of drought and domestic shortfall, grains are to be imported, exerting an upward pressure on the prices.
- **Leakages:** The off take of grains have increased. But CACP data shows consumption at 60% of off take. Rest 40% is leaked into open market.
- Food grains are leaked during transportation to the ration shop and from the ration shop itself into the open market.
- **Inefficiencies in the supply chain** including procurement, storage and delivery mechanisms.
- **Food Subsidy:** The cost of procuring and delivering food grains is about six times its sale price. This raises questions regarding the financial feasibility of the whole exercise.
- **Storage Capacity:** There is imbalance in the storage capacity across states. This compromises quality of food grains. In 2010, Supreme Court made observation regarding rotting grains due to inadequate storage facilities.

Alternatives to TPDS:

- **Direct Benefit Transfer (DBT)**: Cash reduces administrative cost, expands choice and encourages competitive pricing among grocery stores. However direct monetary benefits are not **inflation proof**. Financial inclusion, financial literacy and physical accessibility of food grains are other major hindrance.

Student Notes:

- **Universal PDS**: Removes the errors of exclusion of eligible and vulnerable families. However, its financial viability in the long run is questionable. The better off sections experience an income transfer at the cost of large subsidies for the government. Universal PDS also reduces the entitlements of the poor. Also, the per-capita entitlement of the poor is lower since there is an upper limit to the entitlements per household and average size of poor households is higher.
- **Food Coupons**: Reduces corruption, offer more choice and the beneficiaries can avoid poor quality grains. However, the coupons can be counterfeited.

Way Forward:

- Despite shortcomings, TDPS has been an effective method to ensure food security, poverty alleviation and empower weaker sections of the society.
- In order to improve the efficacy of TPDS, the government has taken up several measures such as door-step delivery of food grains, correct identification of beneficiaries, improve food grains offtake, greater monitoring and vigilance, improving viability of fair price shop operations.

The Plan Scheme on end-to-end Computerisation of TPDS Operations, facilitating digitization of ration cards/beneficiary and other databases, computerisation of supply-chain management, setting up of transparency portals and grievance redressal mechanisms, is a step in the right direction.

ECONOMICS OF ANIMAL REARING

Student Notes:

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1. Introduction

Livestock evolved over the past 12000 years ago through selection by human communities and adaptation to new environments. It is believed that goat and sheep were first animal species to be domesticated. The Cow was the last major animal domesticated by the human beings, about 8000 years ago in Turkey or Macedonia. In the Indian Subcontinent, the people of Indus Valley domesticated Indian Jungle Fowl primarily of its egg production, which later became the World's Chicken,

Today, humans depend upon animal to fulfill many of its needs such as food (milk, meat and egg), clothing (hide or wool), labour (pulling, carrying load) and security. The development of desirable qualities in all such animal species, through creating better breeds, has been an important human achievement. For this, humans have consistently tried to improve the breeds of domesticated animals to make them more useful for them.

Animal husbandry refers to livestock raising and selective breeding. It is the branch of agricultural sciences that deals with the study of various breeds of domesticated animals and their management for obtaining better products and services. When the knowledge of animal husbandry is incorporated with standard business practices, it is called Livestock Management.

Following table presents some example of Livestock uses:

Commodity	Food	By-products and other uses
Dairy	Fluid and dried milk, butter, cheese and curd, casein, evaporated milk, cream, yoghurt and other fermented milk, ice cream, whey	Male calves and old cows sold into the cattle commodity market; milk as an industrial feedstock of carbohydrates (lactose as a diluent for drugs), proteins (used as a surfactant to stabilize food emulsions) and fats (lipids have potential uses as emulsifiers, surfactants and gels), offal
Cattle, buffalo, sheep	Meat (beef, mutton), edible tallow	Hides and skins (leather, collagens for sausage casings, cosmetics, wound dressing, human tissue repair), offal, work (traction), wool, hair, dung (as fuel and fertilizer), bone meal, religious objects, pet food, tallow and grease (fatty acids, varnish, rubber goods, soaps, lamp oil, plastics, lubricants) fat, blood meal
Poultry	Meat, eggs, duck eggs (in India)	Feathers and down, manure (as fertilizer), leather, fat, offal, flightless bird oil (carrier for dermal path pharmaceuticals), weed control (geese in mint fields)
Pig	Meat	Hides and skins, hair, lard, manure, offal
Fish (aquaculture)	Meat	Fishmeal, oil, shell, aquarium pets
Horse, other equines	Meat, blood, milk	Recreation (riding, racing), work (riding, traction), glue, dog feed, hair
Micro-livestock (rabbit, guinea pig), dog, cat	Meat	Pets, furs and skins, guard dogs, seeing-eye dogs, hunting dogs, experimentation, sheep herding (by the dog), rodent control (by the cat)
Bulls		Recreation (bull-fighting, rodeo riding), semen
Insects and other invertebrates (e.g., vermiculture, apiculture)	Honey, 500 species (grubs, grasshoppers, ants, crickets, termites, locusts, beetle larvae, wasps and bees, moth caterpillars) are a regular diet among many non-western societies	Beeswax, silk, predatory insects (>5,000 species are possible and 400 are known as controls for crop pests; the carnivorous "tox" mosquito (Toxorhynchites spp.) larvae feeds on the dengue fever vector, vermicompositing, animal fodder, pollination, medicine (honeybee venom to treat arthritis), scale insect products (shellac, red food dye, cochineal)

2. Significance of Animal Rearing

The livestock plays an important role in the economy of farmers. The farmers in India maintain mixed farming system i.e. a combination of crop and livestock where the output of one enterprise becomes the input of another enterprise thereby realize the resource efficiency. The livestock serve the farmers in different ways.

1. **Income**: Livestock is a source of subsidiary income for many families in India especially the resource poor who maintain few heads of animals. Cows and buffaloes if in milk will provide regular income to the farmers through sale of milk. Animals like sheep and goat serve as sources of income during emergencies to meet exigencies like marriages, treatment of sick persons, children education, repair of houses etc. The animals also serve as moving banks and assets which provide economic security to the owners.
2. **Employment:** A large number of people in India being less literate and unskilled depend upon agriculture for their livelihoods. But agriculture **being seasonal in nature could provide employment for a maximum of 180 days in a year.** The landless and less land people depend upon livestock for utilizing their labour during lean agricultural season.

Student Notes:

3. **Food:** The livestock **products such as milk, meat and eggs are an important source of animal protein to the members of the livestock owners.**
4. **Social security:** The animals offer **social security** to the owners in terms of their status in the society. The families especially the landless which own animals are better placed than those who do not. Gifting of animals during marriages is a very common phenomenon in different parts of the country. Animals are **used for various socio religious function**s. Bulls and Cows are worshipped during various religious functions.
5. **Draft :** The bullocks are the back bone of Indian agriculture. The farmers especially the marginal and small depend upon bullocks for ploughing, carting and transport of both inputs and outputs.
6. **Animal Waste:** In rural areas dung is used for several purposes which include fuel (dung cakes), fertilizer (farm yard manure), and plastering material.

3. Status of Animal Rearing in India

3.1. Employment in the Sector

As per Annual Report 2017-18 of Periodic Labour Force Survey, the Percentage of usually working persons (ps+ss) engaged in Animal Production, Mixed farming, Fishing and Aquaculture is as under:

Percentage of usually working persons (ps+ss) engaged in Animal Production, Mixed farming, Fishing and Aquaculture during 2011-12$ and 2017-18#

Industry (Group as per NIC-2008)		2011-12	2017-18
Code	Description		
014	Animal Production	2.75	2.10
015	Mixed farming	0.83	1.41
031	Fishing	0.28	0.23
032	Aquaculture	0.05	0.08

3.2. Livestock and Poultry Population

India has vast resource of livestock and poultry, which play a vital role in improving the socio-economic conditions of rural masses. There are about 303.76 million bovines, 74.26 million sheep, 148.88 million goats and about 9.06 million pigs as per 20th Livestock Census in the country. The species wise population of animals in Livestock and Poultry population are as follows:

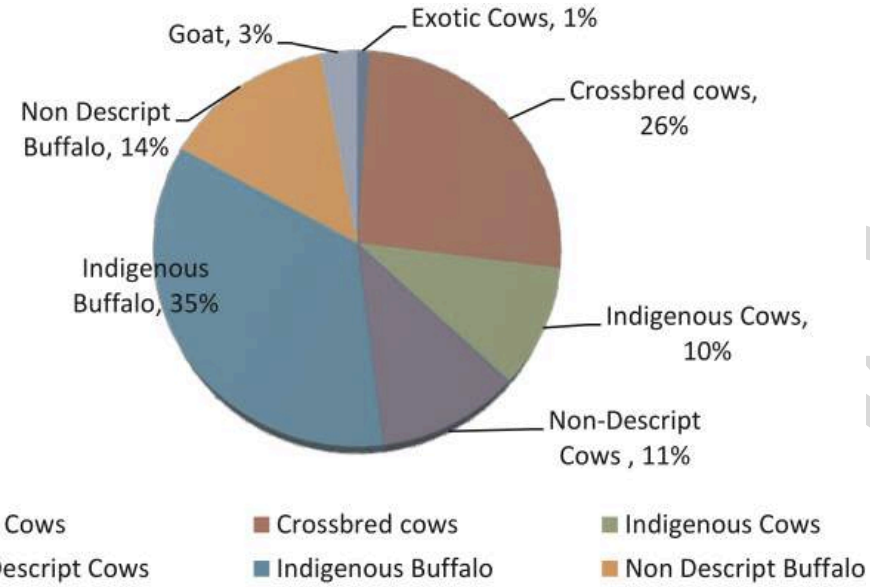
S. No.	Species	19th Livestock Census 2012 (no. in millions)	20th Livestock Census 2019(no. in millions)	Growth Rate (%) 2012-19
1	Cattle	190.90	193.46	1.34
2	Buffalo	108.70	109.85	1.06
3	Yaks	0.08	0.06	-25.00
4	Mithuns	0.30	0.39	30.00
	Total Bovines	299.98	303.76	1.26
5	Sheep	65.07	74.26	14.12
6	Goat	135.17	148.88	10.14
7	Pigs	10.29	9.06	-11.95
8	Other animals	1.54	0.80	-48.05
	Total Livestock	512.06	536.76	4.82
9	Poultry	729.21	851.81	16.81

Student Notes:

3.3. Livestock Production

According to National Accounts Statistics 2019 by Central Statistics Office (CSO), the value of output from livestock was about 31.81% of total agriculture and allied sector.

- **Milk:** India is the largest producer of milk in the world. Milk production 2018-19 was 187.7 million tonnes (6.47% more than previous year). The per capita availability of milk is around 394 grams per day. Following chart shows the contribution of milk production by cow, buffalo and goat in 2018-19.



- **Eggs:** Poultry production in India has taken a quantum leap in the last four decades, emerging from an unscientific farming practice to commercial production system. Currently the total Poultry population in our country is 851.81 million and egg production is around 103.3 billion numbers during 2018-19. The per capita availability is around 79 eggs per annum.
- **Wool Production:** Wool production in the beginning of Twelfth Plan (2012-13) was 46.1 million Kg and increased to 48.1 million Kg in 2014-15 but declined to 40.4 million Kgs in 2018-19.
- **Meat Production:** Meat production in the beginning of Twelfth Plan (2012-13) was 5.95 million tonnes which has been further increased to 8.1 million tonnes in 2018-19.

4. Challenges faced by Animal Husbandry Sector

- **Lower Farm Productivity:** The average annual milk yield of Indian cattle is 1172 kg which is only about 50 per cent of the global average. The frequent outbreaks of diseases like Foot and Mouth Diseases, Black Quarter infection; Influenza, etc. continue to affect Livestock health and lowers productivity.
- **Lack of Access to credit:** The sector received only about 12 per cent of the total public expenditure on agriculture and allied sectors, which is disproportionately lesser than its contribution to agricultural GDP. Financial institutions have also neglected the sector. The share of livestock in the total agricultural credit has hardly ever exceeded 4% of the total credit.
- **Lack of access to organized markets**: Most of the farmers lack access to formal market for their produce. They sell their produce to the local marker which result in **meager profits.** Also the Informal market intermediaries exploit the producers.

- **Loss of pastures: Shrinking and degrading pastures coupled with limitations of fodder** have been the major constraints for the animal husbandry sector to reach its full potential. Absence of **Livestock extension services:** . The extension format, methodology and set-up established for agriculture has failed to cater to the needs of the livestock sector. Consequently, only 5.1% of the farm households were able to access any information on animal husbandry against 40.4% for crop farming. The only centrally sponsored scheme on "Livestock extension and delivery services" with a budgetary outlay of Rs. 15.00 crore remained non-operational.
- **Insufficient veterinary services and diseases control:** The sector suffers from insufficient infrastructure and human resources for timely disease diagnosis, reporting, epidemiology, surveillance and forecasting. Quality control for veterinary drugs and vaccines is almost non-existent.
- Poor quality Control: Testing of milk and other livestock produce for **safety and quality parameters at the collection centers is almost non-existent**. Lack of proper anaerobic waste treatment and dairy by-product utilization are the other concerns. Due to quality concerns of milk, value addition and export potential has not been fully exploited. There is demand for Indian ethnic meat products in the international market. However, l**ack of international processing standards** is the hindrance.
- **Non preference for indigenous species:** India has huge diversity of animals, which are adaptable to harsh climate, limited nutrition, and resistance to diseases and stress. Populations of most of these breeds have alarmingly gone down due to **comparative preferences for highly productive exotic breeds**.

5. Government Initiatives

To overcome the aforementioned challenges, the government has come up with various schemes and plans. Some of them are discussed below:

5.1. National Animal Disease Control Programme for FMD and Brucellosis

Salient Features of the Programme

- The aim of the NADCP is to control Foot and Mouth Diseases (FMD) by 2025 with vaccination and its ***eventual eradication by 2030***. This will result in increased domestic production and ultimately in increased exports of milk and livestock products.
- **Intensive Brucellosis Control** programme in animals is envisaged for controlling Brucellosis which will result in effective management of the disease, ***in both animals and in humans.***
- It is **a Central Sector Scheme** where ***100% of funds*** shall be provided by the Central Government to the States / UTs.
- The mission mode approach for eradication of these diseases is the ***biggest step any country of the world*** has ever taken either for human or animal vaccination programme to control any disease.
- This programme combined with providing unique ***PashuAadhar*** to 535 million animals (Cattle, buffalo, sheep, goat, and pig).

5.2. Nationwide Artificial Insemination Programme

Salient Features of the Programme

- The programme aims to inseminate 20,000 bovine per district for 600 districts in the country.
- **The NAIP is a campaign mode genetic up-gradation program** covering all breeds of bovines to enhance milk production using low-cost breeding technology for improving the genetic merit of milch animals with high-quality seed.

- Under this, **every cow and buffalo under AI will be tagged** and can be tracked through the Information Network on Animal Productivity and Health (INAPH) Database.
- It is one of the **largest such programmes for breed improvement** with 100% central assistance.

5.3. National Livestock Mission

Salient Features of the Mission

- The Mission is designed to cover all the activities required to ensure **quantitative and qualitative improvement** in livestock production systems and capacity building of all stakeholders.
- It is formulated with the **objective of sustainable development of livestock sector**, focusing on improving availability of quality feed and fodder.
- NLM has four sub-missions as follows:
    - **The Sub-Mission on Fodder and Feed Development: It** will address the **problems of scarcity of animal feed resource**s, in order to give a push to the livestock sector making it a competitive enterprise for India, and also to harness its export potential.
    - **Sub-Mission on Livestock Development**: **Under the sub-mission,** there are provisions for productivity enhancement, entrepreneurship development and employment generation, strengthening of infrastructure of state farms with respect to modernization, automation and biosecurity, conservation of threatened breeds, minor livestock development, rural slaughter houses, fallen animals and livestock insurance.
    - **Sub-Mission on Pig Development in North-Eastern Region**: There has been persistent demand from the North Eastern States seeking support for all round development of piggery in the region. **For the first time**, under NLM a Sub-Mission on Pig Development in North-Eastern Region is provided wherein Government of India would support the State Piggery Farms, and importation of germplasm.
    - **Sub-Mission on Skill Development, Technology Transfer and Extension**: The emergence of new technologies and practices require linkages between stakeholders and this sub-mission will enable a wider outreach to the farmers. All the States, including NER States may avail the benefits of the multiple components and the flexibility of choosing them under NLM for a sustainable livestock development.

5.4. National Mission on Bovine Productivity

Salient Features of the Mission

- The mission has been initiated in November 2016 . It will be implemented as a part of **Rashtriya Gokul Mission under umbrella scheme White Revolution- Rashtriya Pashudhan Vikas Yojna.**
- The objective is to enhance milk production and productivity of bovine population, increase trade of livestock and its products, e-market for bovine germplasm and to double farmers' income by 2022.
- It has 4 components:
    - **Pashu Sanjivni:** an animal wellness program with provision of **Nakul Swasthya Patra** (animal health card) along with unique ID to animals and uploading data on National Data Depository.
    - **Advanced breeding technology:** IVF/MOET (In-Vitro fertilization/Multiple-ovulation embryo transplant) **and sex sorted semen technique** to improve availability of disease free high genetic merit female bovines.
    - **e-Pashuhaat:** a website portal launched on birthday of V. Kurien on 26 Nov 2016 to connect the breeders and farmers for sale and purchase of germplasm.
    - **National Bovine Genomic Centre for indigenous breeds (NBGC-IB)**

Student Notes:

5.5. National Programme for Bovine Breeding and Dairy Development

Salient Features of the Programme

- The program has been initiated in 2014 by **merging four ongoing schemes** of the Department of Animal Husbandry, Dairying and Fisheries in the dairy sector:
  - National Project for Cattle and Buffalo Breeding (NPCBB)
  - Intensive Dairy Development Programme (IDDP)
  - Strengthening Infrastructure for Quality & Clean Milk Production (SIQ & CMP); and
  - Assistance to Cooperatives (A to C)
- The **aim is to integrate milk production and dairying activities** in a scientific and holistic manner, so as to attain higher levels of milk production and productivity, and to meet the increasing demand for milk in the country.
- The Scheme **has two components**
  - **National Programme for Bovine Breeding (NPBB)**
  - **National Programme for Dairy Development (NPDD**)
- **NPBB focuses on** to ensure quality Artificial Insemination services at farmers doorstep through **MAITRI** (Multipurpose AI Technician in Rural India) and to conserve, develop and proliferate selected indigenous bovine breeds of high socio-economic importance. **Rashtriya Gokul Mission** comes under the ambit of this programme.
- **NPDD will focus on** creating infrastructure related to production, procurement, processing and marketing by milk unions/federations and also extension activities including training of farmers.
- Under this scheme, there **is provision for rehabilitation assistance** to improve the condition of sick milk cooperatives by providing a central grant up to 50 % of the cost of the rehabilitation project with a maximum financial ceiling of Rs.5 crore.

5.5.1. Rashtriya Gokul Mission

- Rashtriya Gokul Mission has been initiated under **National Programme for Bovine Breeding (NPBB)** in December 2014.
- It is being implemented with the objectives of:
  - Development and conservation of indigenous breed
  - Breed improvement programme or indigenous cattle breeds to improve their genetic makeup and increase the stock
  - Enhancement of milk production and productivity
  - Upgradation of nondescript cattle using elite indigenous breeds like Gir, Sahiwal, Rathi, Deoni, Red Sindhi
  - Distribution of disease free high genetic merit bulls for natural service.
- The mission includes establishment of
  - **Gokul Gram** (Integrated Indigenous Cattle Centres)
  - **Gopalan Sangh** (Breeder's Societies)
  - **National Kamdhenu Breeding Centres** for development, conservation and preservation of indigenous breeds are being established one in north and one in south India, as a Centre of Excellence, to develop and conserve Indigenous Breeds. **Besides being a repository of indigenous germplasm, it will also be a source of certified germplasm in the Country.**

5.6. Dairy Entrepreneurship Development Scheme

- The scheme was started in September, 2010 with the objective **to generate self employment opportunities in dairy sector** in the country.
- It is being implemented through NABARD which provides **financial assistance to commercially bankable projects** with loans from Commercial, Cooperative, Urban and

Student Notes:

Rural banks with a back ended capital subsidy of 25% of the project cost to the beneficiaries of general category and 33.33% of the project cost to SC & ST beneficiaries.

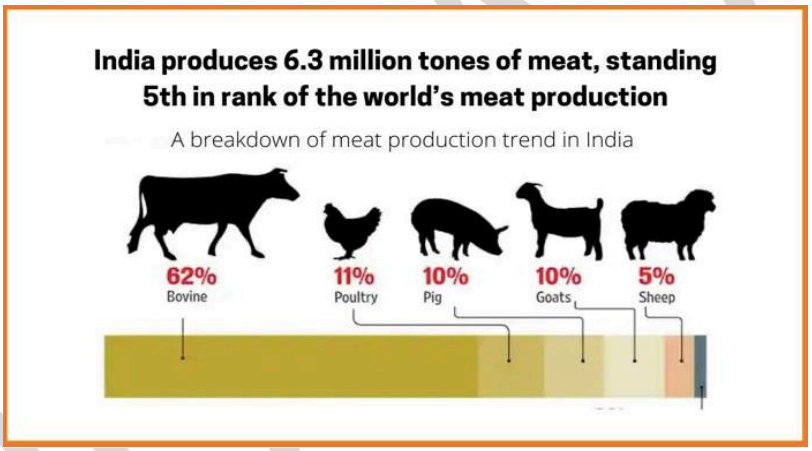
- The activities include **establishment of small dairy unit from 2 to 10 milch animals**, rearing of heifers (up to 20 calves), vermicompost, purchase of milking machines, etc.
  An individual entrepreneur, farmer, group of farmers, self-help groups (SHGs**), Dairy Cooperative Societies, district milk unions and Panchayati Raj Institutions(PRIs)** are eligible under the scheme.

6. Pink Revolution

Pink Revolution refers to the modernization i.e. specialization, mechanization, and standardization of processes of the meat and poultry processing sector.

6.1. Factsheet

- In 2014, India surpassed Brazil and Australia to become the **largest bovine meat exporting country in the world.** Bovine meat became India's top agricultural export item ($4781m), ahead of Basmati Rice in 2014-15. Indian meat is primarily exported to Middle East and South East Asia.



- **The broiler sector is among the fastest growing sectors** in the Indian economy at a rate of 8 percent. The egg production in the country has increased from around 83 billion nos. in 2015-16 to around 88 billion in 2016-17 registering a growth of about 6%. In total, Poultry sector in India is valued at about Rs. 80,000 crore (2015-16).
- Among the states**, Andhra Pradesh, Tamil Nadu and Maharashtra** are the top egg producers in the country.
- The largest producer of meat in the country is Uttar Pradesh producing 23% of the total meat followed by West Bengal contributing 12% to the meat production. Andhra Pradesh is the third largest meat producer in the country which produces 7% of the total production.
- Haryana, West Bengal & Uttar Pradesh are the leaders in poultry meat production in the country.
- **About 10% of the rural labor force** is involved in livestock rearing occupation, which constitutes 26% of the total agricultural value added.

6.2. Challenges faced by Indian Meat Sector

- The meat sector in India is largely Unorganized (90% unorganized). It inhibits government regulation and therefore required support.
- Also there is **lack of adequate infrastructure for meat production and processing** like abattoirs and cold storage. Also there exists lack of awareness about food safety norms and packaging standards.
- The unregulated meat markets, tropical climate, inadequate slaughterhouse hygiene measures and the lack of surveillance of meat-borne diseases enhance the risk of meat-borne diseases and occupational hazards
- Indian meats are ***considered to of poor quality*** as animals are not specifically bred for slaughtering. Usually spent animals (old age farm animals) are generally used for meat production.

- There exits lower domestic demand, low per capita meat consumption in India (5.2 Kg/year vs 39.8 kg global average)

6.3. Initiatives by the Government

- 100% FDI permitted **through automatic route** in food processing sector.
- **Concessional rate of Customs Duty** applicable on imported equipment under the project import benefits.
- Income Tax deductions on capital expenditure allowed at the rate of 150% for setting up and operating cold chain or warehouse for storage of agriculture produce.
- 100% income tax exemption available to new food processing, preservation and packaging units for the first 5 years of operation, and at the rate of 25%-30% thereafter.
- **A fund of 20 billion created** with National Bank for Agriculture and Rural Development (NABARD) for extending affordable credit to designated Food Parks and units therein.

7. Fisheries

7.1. Background

- Fisheries are **an important source of food, nutrition, employment and income in India.** The sector provides livelihoods to about 16 million fishers and fish farmers at the primary level and almost twice the number along the value chain. Fish being an affordable and rich source of animal protein, is one of the healthiest options to mitigate hunger and malnutrition.
- The share of fisheries sector in the total GDP increased from 0.40% in 1950-51 to 1.03% in 2017-18. It accounts for about 6.58% share of agricultural GDP.
- In India, **Fisheries is a state subject**. While Inland Fisheries are fully managed by state governments, Marine Fisheries are a shared responsibility between the Central and Coastal State/UT Governments.

7.2. Constraints in the growth of the Sector

- Major constraints impacting the growth of **marine fisheries** include limited scope for expansion due to overcapacities in territorial waters, weak regulation, inefficient management and prevalence of traditional fishing practices.
- Inadequate infrastructure especially fishing harbors, landing centers, cold chain and distribution systems, poor processing and value addition, wastage, traceability and certification, non-availability of skilled manpower, etc. are some of the other factors constraining the growth of the capture fisheries.
- In **inland capture fisheries**, seasonal nature of fishing operations, depleted stocks in natural waters, issues related with tenure and lease rights, use of obsolete technology for harvesting coupled with low capital infusion are some of the significant limiting factors
- Specific problems negating the growth of **culture fisheries** inadequate access to institutional credit and high cost of credit, inadequate infrastructure for pre-production, production, post-harvest and processing facilities, low adoption of technologies and shortage of skilled manpower in aquaculture and extension services.

7.3. National Fisheries Policy 2020

Mission

- The policy aims to develop an **ecologically healthy, economically viable and socially inclusive fisheries sector** that contributes towards economic prosperity and well-being of fishers and fish farmers, and provides food and nutritional security to the country in a sustainable and responsible manner.

Student Notes:

Objectives:

The major objectives of the policy include:

- A **robust management and regulatory framework** with necessary legal backing for effective fisheries resource management through an Ecosystem Approach of Fisheries (EAF) management.
- **Modernize, rationalize** (infuse science and technology) and diversify fishing practices in oceans and seas with sustainability of resources as the core philosophy.
- Conserve **and manage native fish genetic stocks** and associated habitats and ecosystem.
- **Strengthen and modernize value chain including** creation of fisheries infrastructure to increase shelf life, reduction of post-harvest lossesand production of value added products.
- **Generate gainful employment and entrepreneurship opportunities** along the value chain leading to higher income of fishers and fish farmers, improve their living standards and usher in economic prosperity.
- **Ensure food and nutritional security** by increasing the per capita availability of safe, affordable and quality fish.

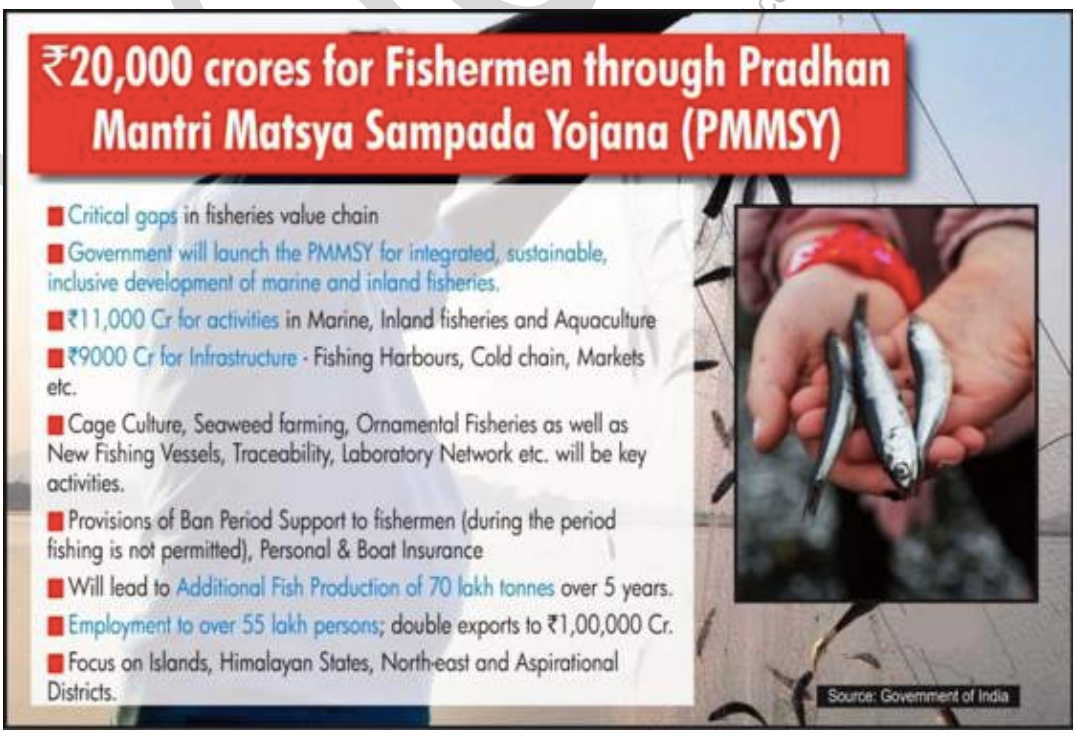
7.4. Pradhan Mantri Matsya Sampada Yojana

Introduction

- The scheme was launched in September 2020 by PM Narendra Modi with an aim to enhance fish production to 220 lakh metric tons by 2024-25 from 137.58 lakh metric tons in 2018-19 at an average annual growth rate of about 9%.

The major objectives of the scheme include:

- Enhancing fish production by an additional 70 lakh tonne till 2024-25,
- Increasing fisheries export earnings to Rs.1,00,000 crore,
- Doubling of incomes of fishers and fish
- Reducing post-harvest losses from 20-25% to about 10%
- **Generation of additional 55 lakhs direct and indirect gainful employment opportunities in the fisheries sector and allied activities farmers**



Student Notes:

7.5. Blue Revolution– Neel Kranti Mission

The government of India restructured the central plan scheme under an umbrella of **Blue Revolution: Integrated Development and Management of Fisheries** (Central Sector Scheme)**.**

Vision

"Creating an enabling environment for integrated development of the full potential of fisheries of the country, alongwith substantially improvement in the income status of fishers and fish farmers keeping in view the sustainability, bio-security and environmental concerns."

Mission

- Formulation of a Neel Kranti Mission Plan (Blue Revolution Mission Plan) for tapping the full potential of the inland and marine culture fisheries of the country by developing it as a professional modern world class industry.
- Ensure doubling of income of fishers and fish farmers of the country.
- Ensure sustainability of, bio-security and address environmental concerns for enabling sustainability of the fishing industry.

Objectives

- To fully tap the total fish potential of the country both in the inland and the marine sector and triple the production by 2020.
- **To transform the fisheries sector** as a modern industry with special focus on new technologies and processes.
- To double the income of the fishers and fish farmers with special focus on increasing productivity and better marketing postharvest infrastructure including e-commerce and other technologies and global best innovations.
- To ensure inclusive participation of the fishers and fish farmers in the income enhancement.
- **To triple the export earnings by 2020 with focus on benefits** flow to the fishers and fish farmers including through institutional mechanisms in the cooperative, producer companies and other structures.
- To enhance food and nutritional security of the country.

Strategy – Central Sector Assistance Schemes

The Ministry of Agriculture and Farmers Welfare, Department of Animal Husbandry, Dairying & Fisheries has accordingly restructured the scheme by merging all the ongoing schemes under an umbrella of Blue Revolution. The restructured scheme provides focused development and management of fisheries, covering inland fisheries, aquaculture, marine fisheries including deep sea fishing, mariculture and all activities undertaken by the National Fisheries Development Board (NFDB).

The restructured Plan Scheme on Blue Revolution: Integrated Development and Management of Fisheries" has been approved at a total central outlay of Rs. 3000 crore for implementation during a period of five years (2015-16 to 2019-20) with the following components:

- **National Fisheries Development Board** and its activities: increasing fish production, enhance its exports, apply modern tools and techniques, creation of employment etc.
- **Development of Inland Fisheries and Aqua Culture**: Construction and renovation of ponds, establishing fish hatcheries, stocking of fingerlings, training and skill development etc
- **Development of marine fisheries, infrastructure and post-harvest operations**: Motorization of traditional craft, promotion of mariculture in the form of sea cages, see weed cultivation, bi-valve cultivation and pearl culture, infrastructure like ice plants, cold storages development etc.
- **Institutional arrangements for fisheries sector**

- **Strengthening of data base and Geographical Information System of the fisheries sector**: assistance to state governments for collection and supply of fisheries data, development of GIS, mapping of water bodies etc.
- **Monitoring, control and surveillance (MCS) and other need based interventions:**
  - Biometric ID card to marine fishers
  - registration of their vessels
  - upgradation of the registration centres into Fisheries Monitoring Control and Surveillance centres (FMCS)
- **National scheme of welfare of fishers:** Housing for fishermen, basic amenities, group accident insurance for active fisherman, Grant in aid to the National Federation of Fishers Cooperative ltd **(FISHCOPFED**).

An Integrated **National Fisheries Action Plan 2020** has been developed to achieve the concept of Blue Revolution.

8. Operation Flood

Major Achievements of the operation

- It is the **world's biggest dairy development program**, launched in 1970 by National Dairy Development Board (NDDB) under the guidance of Vergese Kurien.
- It transformed India from a milk-deficient nation into the world's largest milk producer. Surpassing USA in 1998 as the largest producer, India achieved about 17 percent of global output in 2010–11.
- In 30 years **it doubled milk available per person**, and made dairy farming India's one of the largest self-sustainable rural employment generator.
- Now a National Milk Grid links milk producers throughout India with consumers in over 700 towns and cities, reducing seasonal and regional price variations while ensuring that the producer gets fair market prices in a transparent manner on a regular basis.
- **The bedrock of Operation Flood** has been village milk producers' cooperatives, which procure milk and provide inputs and services, making modern management and technology available to members.
- By 1975 all imports of milk and milk products stopped. Now, India has retained its leadership as the world's largest milk producer for the last 15 years. This has been made possible by Operation Flood — which ushered in the White Revolution in India.

9. Need of a Second White Revolution

- Considering the urbanization and population growth estimates, it is envisaged that India needs **around 600 million metric tonnes of milk per year (65 crore liters per day**) in the year 2050-51 from current level of 176 million metric tonnes per year (48 crore liters per day) to fulfill the demand for milk and milk products.
- This means that India's milk production needs to grow at around 3.2% CAGR for the next 40 years. This can be possible only when dairy farmers are given stable and remunerative prices through proper market linkage. In order to achieve this estimated growth in demand, the time is ripe for the Second White Revolution in India.

In order to achieve this following methods are suggested:

- **Large scale dairy farms:** Large scale cooperatives and corporates can **establish integrated dairy farms**, with automated milking, feeding, processing, integrated feed production and in-house breed improvement. They can sell their produce to other dairy plants or can do further value addition.
- **Hub and Spoke Model:** The main farm (hub), owned by an anchor will have all the integrated facilities for milking, feed production and milk processing with a cattle count of over 500 cows. The connected/satellite farms (spokes), with 50 to 200 cattle each, can have

basic infrastructure for milking and cattle management **The anchor would provide technical support (veterinary care, feed management, and training) to the satellite farms. This model will be socially inclusive.**

- **Progressive dairy farmer:** This model envisages investment in farm infrastructure by an anchor. **Cow stalls are leased out on nominal charges to farmers, who are responsible for housing of cows and managing them under guidance of the anchor**. The automation level of the farms can depend on the farm size. The milk would be purchased under a buy-back arrangement by the anchor. This model enables the smallest dairy farmers to avail the benefits of technology, scale and systems. This model **includes the concept of building hostels for cows** and to establish mid-sized dairy farms with 200-300 cattle.
- **Community Model: Community ownership and management of common infrastructure** for housing, breeding, feeding and milking under a cooperative/producer company model shall be applicable here. A number of such farms within a restricted geographical periphery can avail of technical support services on a pooling basis. Farmers are not restricted to sell their milk to a specific entity. Milking machines, equipment, bulk coolers and milk storage facilities are owned by the community.

10. Previous Years UPSC Mains Questions

1. Livestock rearing has a big potential for providing non-farm employment and income in rural areas. Discuss suggesting suitable measures to promote this sectors in India (2015)
2. The India needs to strengthen measures to promote the pink revolution in food industry for better nutrition and health. Critically elucidate the statement. (2013).

11. Previous Year Vision IAS GS Mains Test Series Questions

1. ***Animal rearing is a key livelihood and risk mitigation strategy for tribals and small and marginal farmers, particularly across the rainfed regions of India. Substantiate. Also, discuss some strategies to realize the potential of this sector.***

Approach:

- Briefly discuss the scope of the sector.
- Bring out its significance for tribals and small and marginal farmers.
- Discuss steps that need to be taken to realize the potential of the sector.

Answer:

Livestock have been an integral component of India's agricultural and rural economy. Livestock contribute over 1/4th to the agricultural GDP and about 5% of the country's GDP and engage about 9% of the agricultural labor force. The livestock sector has been growing faster than crop sector.

Its growth has special significance for small and marginal farmers, landless laborers and tribals and farmers in rain-fed areas as they are more dependent on livestock for supplementing incomes and generating gainful employment. To elaborate:

- In India, livestock wealth is much more equitably distributed than wealth associated with land.
  About 70 per cent of the livestock market in India is owned by 67 per cent of the small and marginal farmers and by the landless. Thus, growth of the livestock sector would reduce poverty more than growth of the crops sector.
- Distribution patterns of income and employment show that rural poverty is less in states where livestock accounts for a sizeable share of agricultural income as well as employment.

Student Notes:

- The small ruminants and poultry livestock provide livelihood support to the poor underprivileged landless, and marginal farm households as there upkeep cost is low and are source of milk, eggs and meat.
- Rain-fed regions face uncertain and erratic weather conditions which negatively impact crop productivity and wage labor in the agriculture sector. Animals are natural capital, which can be easily reproduced to act as a living bank with offspring as interest, and an insurance against income shocks of crop failure, natural calamities and climate change.
- Tribals have community controlled lands which provide them large pastures for their animals. Moreover tribals are still engaged in subsistence agriculture. Thus, livestock is a good source of income and support to them.

In the light of immense potential of the sector in providing inclusive economic growth to the rural folks, government has come up with several projects. Yet, the sector has shown a decline in recent years. Following steps can be taken to improve the potential of the sector:

- Livestock producers, including traditional pastoralists and smallholders, are both victims of natural resource degradation and contributors to it. Corrective action related to environmental protection, ecosystem services, community led interventions and through incentives for private investment should be taken.
- Improving livestock-related technologies for livestock feed, breeding, processing, technical manpower and infrastructure.
- Frequent outbreak of diseases and poor productivity should be tackled with improved focus on animal health and outreach of veterinary services.
- Development of a better paying markets for livestock and commercialization of livestock.

Livestock sector did not receive the policy and financial attention commensurate to its contribution. Systematic implementation of loans and insurance schemes particularly in remote areas is needed.

2. In spite of having the world's largest livestock population in India, the potential of animal rearing remains underutilized. In this context, discuss the challenges faced by the meat and poultry sector and suggest measures for accelerated and sustained growth for this sector.

Approach:

- Give the current status of the livestock population in India.
- List the challenges faced by the meat and poultry sector.
- Then give an account of measures that can be taken for accelerated and sustained growth in the sector.

Answer:

With only 2.29% of the land area of the world, India is maintaining about 10.71% of the world's livestock. A large manpower is also involved in livestock related activities like manufacture of animal food products and beverages, manufacture of textiles, tanning & dressing of leather, farming of animals etc. Despite that, the potential of animal rearing remains underutilised due to various challenges such as:

- **Lack of poultry feed:** Maize is the single most important ingredient of poultry feed, its' availability at a reasonable cost is the major problem of poultry sector.
- Diseases: Pathogenic and emerging diseases often cause heavy losses both in domestic market and international trade.
- Lack of trained Human Resource: This results in less than optimal output.

Student Notes:

- Low productivity: Dead weight of carcass is low, indicating low biomass. For bovine and cattle, milk production is also lesser than international varieties.
- Poor hygiene and upkeep: Poultry unfit to meet industry and export norms.

The challenges faced by the meat sector include:

- Lack of modernised abattoir: it results in poor efficiency and issues of sanitation which hampers export.
- Cultural issues: In some states meat industry has been facing resistance due to religious sentiments.
- Low productivity of livestock: In terms of meat output.
- Low level of processing and value addition in animal products.

Both these sectors suffer from ineffective marketing strategy to project these products.

Way Forward

- Long-term sustainable production measures should be looked into increase the production & quality of maize.
- Active surveillance, monitoring and control in case of any outbreaks in rapid manner. Implementation of livestock insurance insurance schemes is also important.
- Network for a realistic national and global poultry database and marketing intelligence may be developed. Also, the genetic resource of Indian livestock should be conserved through programmes like Gokul Mission.
- Sufficient trained manpower should be developed in the existing institutions.
- The by-products from mechanized abattoirs should be utilized for production of value added products, like Meat-cum-Bone Meal (MBM), Tallow, Bone Chips, Pet Foods and methane, which can be used as a source of energy for value addition in most of the modern plants.
- There is a need to support pig rearing in order to improve sow productivity, growth rate of piglets and feed conversion efficiency.
- Proper utilization of by-products of livestock slaughter for higher income of livestock owners.
- The environmental pollution and spread of livestock diseases should be prevented.

With growing urbanization and increasing quality consciousness, the market for scientifically produced meat products is growing for ready-to-eat and semi-processed meat products. With proper utilisation of livestock resources India needs to be ready for changing socio-economic scenario.

3. "Compared to animal husbandry's contribution to the Indian economy, the sector has received much less resources and institutional support." Analyse the above statement in the light of challenges faced by livestock sector in India.

Approach:

Comment on the challenges faced by the animal husbandry sector, referring to its various components, bringing out the shortcomings and suggesting measure that needs to be taken to improve the situation of animal husbandry in India.

Answer:

[The answer deals with every section of the livestock sector separately detailing each section's challenges and suggestions making this answer quite long. This has been done to provide sufficient details with respect to livestock sector so that students can confidently tackle any section specific question in the examination]

Student Notes:

The animal production system in India is predominantly part of a mixed crop-livestock farming system vital for the security and survival of large numbers of poor people. In such systems, livestock generate income; provide employment, draught power and manure. Also it is a major source of milk, meat, eggs, wool and hides. Thus, animal husbandry plays an important role in the rural economy.

India's livestock sector is one of the largest in the world. In 2010-11 livestock generated outputs worth Rs 2075 billion (at 2004-05 prices) which comprised 4% of the GDP and 26% of the agricultural GDP. The total output worth was higher than the value of food grains. Therefore, though animal husbandry has got special attention through various schemes and programmes of the GOI to remove the bottlenecks hindering this sector much still needs to be done.

There are number of socio-economic, environmental, technological and other challenges that need to be overcome through appropriate policies, technologies and strategies in order to harness the pro-poor potential of animal husbandry. Various sub sector specific challenges along with their solutions are as follows:-

Dairy Sector:

India continues to be the largest producer of milk in the world. Production is estimated to be around 121.8 million tonnes during 2010-11 as compared to 53.9 million tonnes in1990-91. Per capita availability of milk at national level has increased from 176 grams per day in 1990-91 to 281 grams per day in 2010-11.

The challenges faced by the dairy sector are:

- Small herd size and poor productivity
- Inadequate budgetary allocation over the years
- Lack of equity with crop production
- Inadequate availability of credit
- Poor access to organized markets deprive farmers of proper milk price
- Shortage of manpower and funds
- Limited availability of quality breeding bulls
- Disease outbreaks: mortality & morbidity
- Deficiency of vaccines and vaccination set-up
- Induction of crossbred animals in areas poor in feed resources
- Majority of grazing lands are either degraded or encroached
- Diversion of feed & fodder ingredients for industrial use

Way Forward:

- Continuous support to the States is essential for further genetic up gradation programmes to meet the fast increasing demand for milk in the country.
- There is further need to consolidate and improve the breeding infrastructure created under NPCBB, scientific programmes like Embryo Transfer Technology (ETT), Multi Ovulation Embryo Transfer Technology (MOET)
- Incentivizing investment in this sector
- Increasing public investment.

Meat and Poultry Sector:

In terms of population, India ranks second in the world in goats and third in sheep. The growth in poultry production is mainly attributed to the efforts of the organized private sector, which controls over 80% of the total production in the country.

The challenges faced by the sector are:

Student Notes:

- **Maize availability and cost**: maize is the single most important ingredient of poultry feed, it's availability at a reasonable cost is the major problem of poultry sector.
- **Diseases**: Pathogenic and emerging diseases namely AI often causes heavy losses both in domestic market and international trade.
- **Lack of Marketing Intelligence:** There is a dire need for realistic national marketing intelligence to bridge the gap between supply and demand of poultry & poultry products.
- **Human Resource Development**: To meet the growing demand of sustainable and safe production there is a huge demand for trained and skilled manpower in poultry sector.
- Low level of processing and value addition in animal products.

The Way Forward:

The following measures are suggested to strengthen the meat and poultry sector for accelerated and sustainable growth:

- Long-term sustainable production measures have to be looked into to increase the production & quality of maize.
- Active surveillance, monitoring and control in case of any outbreaks in rapid manner.
- Network for a realistic national and global poultry database and marketing intelligence may be developed. Sufficient trained manpower should be developed in the existing institutions.
- With growing urbanization and increasing quality consciousness, the market for scientifically produced meat products is expected to grow rapidly. The market is growing for ready-to-eat and semi-processed meat products because of a changing socio-economic scenario and an increase in exports to neighbouring countries, especially the Middle East.
- The mechanized slaughter houses produce huge quantities of offal and digests from the slaughtered animals which could be profitably utilized for production of value added products, like Meat-cum-Bone Meal (MBM), Tallow, Bone Chips, Pet Foods and methane as a source of energy for value addition in most of the modern plants.
- There is a need to support pig rearing in order to improve sow productivity, growth rate of piglets and feed conversion efficiency.
- It is important to encourage proper utilization of by-products of livestock slaughter for higher income of livestock owners. The environmental pollution and spread of livestock diseases has to be prevented.

Nutrition: Fodder and Feed

With only 2.29% of the land area of the world, India is maintaining about 10.71% of the world's livestock. The nutritive value of feed and fodder has a significant bearing on productivity of livestock. The gap between the demand and supply of fodder is fast increasing.

Challenges:

The main challenges in providing adequate and quality fodder and feed include:

- While numbers of livestock are growing, but the grazing lands are gradually diminishing. The area under fodder cultivation is also limited.
- A majority of the grazing lands have either been degraded or encroached upon restricting their availability for livestock grazing.
- Due to increasing pressure on land for growing food grains, oil seeds, and pulses, adequate attention has not been given to the production of fodder crops.

Student Notes:

- Diversified use of agriculture residues like paper industry, packaging, etc. widening the gap between the supply and demand for fodder.
- There is lack of authentic data on availability of fodder, crop residues, agro industrial by- products and feed grains (coarse cereal grains). This is required to build an actual database, on feed and fodder, to be used for more effective and realistic planning of livestock sector development.
- A substantial amount of crop residues is burnt by the farmers after harvesting of main crop like wheat and paddy.
- In most of the states there are inadequate staffs to address the problems related to fodder.

The Way Forward:

The measures which can contribute to improved fodder and feed situation include the following:

- A reliable data-base is required for assisting in realistic planning.
- Supply of quality fodder and feed should be encouraged on a priority basis.
- The forest department can play a major role in augmenting fodder production in the country. The degraded forest areas, mostly under the Joint Forest Management Committees (JFMCs), can be used for assisting growth of indigenous fodder varieties of grasses, legumes, and trees under area-specific silvi-pastoral systems.
- There is a need for undertaking an effective Extension campaign in major states for efficient utilization of crop residues, growing fodder crops, Azolla production, etc.
- Production of seeds of high yielding fodder varieties needs to be increased in the organized/cooperative sector.
- Production of condensed fodder blocks needs to be encouraged by creating an assured market, coupled with providing a transport subsidy for supply to distant areas.

Livestock Health:

High prevalence of various animal diseases like Foot & Mouth Disease (FMD), Brucellosis, Classical Swine Fever and Avian Influenza is a serious impediment to growth in the livestock sector. There is a dire need to strengthen veterinary hospital facilities for timely diagnosis and treatment of animal diseases. Emphasis also needs to be given to strengthen art mobile veterinary services to ensure door-step veterinary support.

Challenges:

The main challenges confronting the animal health sector include:

- Veterinary hospitals, dispensaries and technical manpower are inadequate.
- The disease reporting is neither timely nor complete which delays proper interventions.
- Inadequate availability of vaccines and lack of cold storage.

The Way Forward:

The following measures will strengthen the animal health sector:

- Adequate veterinary disease diagnosis, epidemiology, hospital infrastructure and manpower need to be developed.
- A strong programme for supply of sufficient veterinary vaccines is necessary.

Fisheries Sector:

India is the second largest producer of fish in the world, contributing 5.54 percent of global production. Allocations made for the development of fisheries sector through

Student Notes:

the Centrally Sponsored Schemes and Central Sector Schemes are utilized for implementation of both development and welfare oriented schemes through the respective states and UTs.

In addition to the allocations made through CSS and CS, assistance is provided through other flagship programmes like Rashtriya Krishi Vikas Yojana (RKVY) and the recently launched National Mission for Protein Supplements (NMPS) as well as other programmes like Marine Fisheries Development Scheme, Inland Fishery Development Scheme, Fishermen Welfare Scheme.

Challenges:

The main challenges facing the fisheries sector include:

- Shortage of quality and healthy fish seeds and other critical inputs.
- Lack of resource-specific fishing vessels and reliable resource and updated data.
- Inadequate awareness about nutritional and economic benefits of fish.
- Inadequate extension staff for fisheries and training for fishers and fisheries personnel.
- Absence of standardization and branding of fish products.

The Way Forward:

The following measures will help to further strengthen the fisheries sector:

- Schemes of integrated approach for enhancing inland fish production and productivity with forward and backward linkages right from production chain and input requirements like quality fish seeds and fish feeds and creation of required infrastructure for harvesting, hygienic handling, value addition and marketing of fish.
- Existing Fish Farmers Development Authority (FFDAs) would be revamped and cooperative sectors, SHGs and youths would be actively involved in intensive aquaculture activities.
- Large scale adoption of culture-based capture fisheries and cage culture in reservoirs and larger water bodies are to be taken up.
- Sustainable exploitation of marine fishery resources especially deep sea resources and enhancement of marine fish production through sea farming, Mari-culture, resource replenishment programme like setting up of artificial reefs.

Therefore, the extent to which the pro-poor potential of livestock can be harnessed would depend on how technology, institutions, policies and financial support address the constraints of the sector. The number-driven growth in livestock production may not sustain in the long run due to its increasing stress on the limited natural resources. The future growth has to come from improvements in technology and service delivery systems leading to accelerated productivity, processing and marketing.

4. In India, livestock sector promotes more equitable sharing of resources and gender equity. Examine.

Approach:

Firstly, along with facts, give an introduction about livestock sector in India. Then, explain the role played by it in India's socio-economic setting and then argue how it brings more equitable sharing of resources and gender equity.

Answer:

India's livestock sector is one of the largest in the world. In 2010-11 livestock generated outputs worth Rs 2075 billion (at 2004-05 prices) which comprised 4% of the GDP and

Student Notes:

26% of the agricultural GDP. The total output worth was higher than the value of food grains.

Animal husbandry is an integral component of Indian agriculture supporting livelihood of more than two-thirds of the rural population. Animals provide nutrient-rich food products, draught power, dung as organic manure and domestic fuel, hides & skin, and are a regular source of cash income for rural households. They are a natural capital, which can be easily reproduced to act as a living bank with offspring as interest, and an insurance against income shocks of crop failure and natural calamities. However, driven by the structural changes in agriculture and food consumption patterns, the utility of livestock has been undergoing a steady transformation.

In India distribution of livestock is more equitable than that of land. It is evident from the data that in 2003 marginal farm households (≤1.0h hectare of land) who comprised 48% of the rural house- holds controlled more than half of country's cattle and buffalo and two-thirds of small animals and poultry as against 24% of land. Livestock has been an important source of livelihood for small farmers. They contributed about 16% to their income.

Similarly, animal husbandry promotes gender equity as more than 3/4th of the labour demand in livestock production is met by women across the India. The share of women employment in livestock sector is around 90% in Punjab and Haryana as well as other states where dairying is a prominent activity and animals are stall-fed.

Thus, the distribution patterns of income and employment show that small farm households hold more opportunities in livestock production. The growth in livestock sector is demand-driven, inclusive, pro-poor and pro -women empowerment. Incidence of rural poverty is less in states like Punjab, Haryana, Jammu & Kashmir, Himachal Pradesh, Kerala, Gujarat, and Rajasthan where livestock accounts for a sizeable share of agricultural income as well as employment. Therefore, empirical evidence from India as well as from many other developing countries suggests that livestock development has been an important route for the poor households to escape poverty and to enhance gender equity in labour force participation in livestock production.

5. The success of "Operation Flood" proves that thoughtful intervention in the livestock sector has the potential of acting as a growth engine for the agriculture sector and rural economy. In light of this, examine the potential of the livestock sector and the challenges it faces. Also enumerate the steps taken by the government in recent years to leverage the potential of this sector.

Approach:

- Briefly write the benefits of Operation Flood and a short introduction of livestock in India.
- Write how livestock can be instrumental in tackling the problems of rural economy.
- Write challenges with respect to the competition, new diseases, pollution etc.
- Various government schemes with respect to insurance, modernisation, quantitative and qualitative development of livestock.

Answer:

It was the organised use of cattle (livestock) that made the Operation Flood a huge success and converted India from a net importer of dairy products to a net exporter and positioned India on top of the list of milk production. Livestock being the internal component of the rural Indian society has huge potential of acting as a growth engine for agriculture and rural economy.

Student Notes:

Mechanization in Agriculture has been to the tune of 20% only, whereas 80% of the agriculture/farm operations are done by bullock drawn implements. Livestock (Bulls) provides draught power and manure to the crop enterprise and this in turn provides feed and fodder.

Fortunately, India is blessed with a tremendous livestock wealth. It has the largest population of cattle and buffalo in the world and its breeds are admired for heat tolerance and inherent resistance to diseases and ability to thrive under different climatic condition. This sector has huge employment potential both for farmers and landless labourers. The rural population can directly form collaboration with big investors or through cooperative society and can leverage the benefit from this sector.

But there are many challenges which are as follows:

- Lack of direct market which hampers the commercialisation of livestock sector.
- Lack of policies, financial and institutional support.
- Stringent food safety and quality norms.
- Frequent outbreaks of diseases continue to affect livestock health and productivity.
- Deteriorating common grazing land which is a major source of food to livestock.
- Large influx of foreign breed has the potential to negatively affect the indigenous breed.

Steps taken by government to leverage the potential of this sector are:

- National Livestock Mission (NLM) launched in FY 2014-15 to ensure quantitative and qualitative improvement in livestock production systems and capacity building of all stakeholders.
- Livestock insurance scheme aims to provide protection mechanism to farmers and cattle rearers against any eventual loss of their animals and to bring qualitative improvement in livestock and their products.
- National Project for Cattle and Buffalo Breeding (NPCBB) aims for genetic up-gradation of cattle and buffaloes by artificial insemination as well as acquisition of proven indigenous animals.
- Strengthening of Database and Information Networking of livestock to target the schemes effectively.
- Ensuring the modernisation of this sector to attract foreign investor.
- There are many disease control programs of government to ensure healthy and productive livestock.

TECHNOLOGY MISSIONS

Student Notes:

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Student Notes:

1. Introduction

Technology Missions are mission-mode projects aiming towards rejuvenating agriculture sector & its sub-sectors via technological enhancements. Techniques adopted for such purposes are generally scientific and mechanized, and support is provided by the Government to procure such advancements by ways of subsidy, promotion, credit-linked subsidy, soft loans, etc.

2. Mission for Integrated Development of Horticulture (MIDH)

- The mission was approved in 2013
- It was targeted to achieve a growth rate of 7.2% in the horticulture in Twelfth Plan.
- MIDH is a **Centrally Sponsored Scheme** for the holistic growth of the horticulture sector covering fruits, vegetables, root & tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa and bamboo.
- While Government of India **(GOI) contributes 85% of total outlay** for developmental programmes in all the states except the states in North East and Himalayas, 15% share is contributed by state governments. In the case of North Eastern States and Himalayan States, GoI contribution is 100%.
- Similarly, for development of bamboo and programmes of National Horticulture Board (NHB), Coconut Development Board (CDB), Central Institute for Horticulture (CIH), Nagaland and the National Level Agencies (NLA), GoI contribution is 100%.

The strategy of the MIDH will be on production of **quality seeds** and planting material, **production enhancement** through productivity improvement measures along with support for creation of infrastructure to **reduce post harvest losses and improved marketing** of produce with active participation of all stake holders, particularly farmer groups and farmer producer organisations. The interventions under MIDH will have a blend of technological adaptation supported with fiscal incentives for attracting farmers as well as entrepreneurs involved in the horticulture sector. It has subsumed 6 ongoing schemes:

1. **National Horticulture Mission (NHM):** applied in all states and UTs except NE and Himalayan Region. It targets small and marginal farmer.
2. **Horticulture Mission in NE and Himalayan Region (HMNEH):** Targets small and marginal farmers of NE and other Himalayan states.
3. **National Bamboo Mission:** applied in all states and UTs to address developmental issues of Bamboo. It mainly emphasized on propagation and cultivation of bamboo, with limited efforts on processing, product development and value addition. There was weak linkage between the producers (farmers) and the industry.
    - **Restructured National Bamboo Mission:** The Cabinet Committee on Economic Affairs (chaired by the Prime Minister) approved Centrally Sponsored Scheme of National Bamboo Mission (NBM) under National Mission for Sustainable Agriculture (NMSA) for remaining period of Fourteenth Finance Commission (2018-19 & 2019-20).
    - An outlay of Rs. 1290 crore (with Rs. 950 crore as Central share) is provisioned for implementation of the Mission.

    The restructured NBM strives:

    - To increase the area under bamboo plantation in non-forest Government and private lands to supplement farm income and contribute towards resilience to climate change.
    - To improve post-harvest management through establishment of innovative primary processing units, treatment and seasoning plants, primary treatment and seasoning plants, preservation technologies and market infrastructure.
    - To promote product development at micro, small and medium levels and feed bigger industry.

Student Notes:

- To rejuvenate the under developed bamboo industry in India.
- To promote skill development, capacity building, awareness generation for development of bamboo sector.

4. **National Horticulture Board (NHB) schemes:** will address developmental issues on commercial horticulture through entrepreneurs involving institutional financing. Applied in all States and UTs
5. **Coconut Development Board (CDB) schemes:** applied in States and UTs producing Coconut
6. **Central Institute of Horticulture (CIH), Nagaland schemes:** in NE states, focusing on HRD and capacity building

MIDH works closely with **National Mission on Sustainable Agriculture (NMSA)** and also provides technical advice and administrative support to the **Saffron Mission,** and other horticulture related activities like **Vegetable Initiative for Urban Clusters (VIUC)** funded by RKVY/NMSA. It encourages aggregation of farmers into farmer groups like FIGs/FPOs (Farmer Interest Groups/Farmer Producer Organisations) and FPCs (Farmer Producer Companies) to bring economy of scale and scope. The overall objective of the scheme is to strengthen nutritional security through enhanced horticulture production and augmenting farmers' income.

3. National Mission on Agriculture Extension and Technology (NMAET)

The mission was approved in 2014 to be implemented during Twelfth Plan Period. It includes four Sub Missions:

1. **Sub Mission on Agriculture Extension (SMAE)**:
   - It focuses on Awareness Creation and enhanced use of appropriate technologies in agriculture & allied sectors.
   - Personnel are trained under **ACABC** (Agri-clinic and Agri-Business Centres schemes) and **DAESI** (Diploma in Agriculture Extension Services for input dealers).
   - Convergence in the schemes is brought by **ATMA** (Agriculture technology management agency**)** and **BTTs** (Block Technology teams).
2. **Sub Mission on Seed and Planting Material (SMSP):**
   - development of quality seeds
   - protection of rights of farmers and plant breeders and
   - to encourage development of new varieties of plants.
3. **Sub Mission on Agricultural Mechanisation (SMAM)**: it will mainly cater the needs of small and marginal farmers through institutional arrangements such as Custom hiring, mechanisation of selected villages, subsidy for procurement of machines and equipments, etc.
4. **Sub Mission on Plant Protection and Plant Quarantine (SMPP):** keeping the crops disease free using scientific and environment friendly techniques through promotion of Integrated Pest management.

Farmers' skill trainings and field extension as contained in all 4 sub missions will be converged with similar farmer related activities going on through ATMA (Agriculture technology management agency).

4. National Mission on Oilseeds and Oil Palm (NMOOP)

The mission was approved in 2014 and has been revised in 2017. Contribution of Centre and State is 75:25. The strategy involves

- increasing seed replacement ratio
- irrigation coverage and

Student Notes:

- use of wastelands and watersheds.

The mission includes three mini missions:

- **Mini Mission I:** to increase production and productivity of oilseeds
- **Mini Mission II**: bringing an additional area of 1.25 Lakh hectare under Oil Palm cultivation by the end of 2016-17 and production of Fresh fruit bunches.
- **Mini Mission III:** aims at enhancing seed collection of Tree Born Oil

Earlier, only 25 hectare area was provided assistance, but **in April, 2017 the restriction has been relaxed to attract corporate bodies** towards oil palm and derive maximum benefits of 100% FDI.

5. National Saffron Mission

The mission was approved in 2010 to bring **economic revival of saffron** in Jammu and Kashmir.

- Its objective is:
  - to increase overall production of saffron
  - enhancing quality of saffron
  - research and extension capability enhancement and
  - to develop appropriate system for organised marketing.
- The scheme also extends support for creation of irrigation facilities through tube wells and sprinklers.
- A Quality control lab and a Saffron Park is established at Pampore, Pulwama under this mission with involvement of NHB.
- **Saffron Mission comes under the umbrella of Rashtriya Krishi Vikas Yojana (RKVY) now.**

6. Technology Mission on Citrus

The mission was announced in 2006 for Vidarbha region.

- It was later extended to Marathwada and Chhindwara as well.
- The objective of the mission is:
  - Production of disease free planting material of citrus
  - Human Resource Development through training of horticulture officers on campus and training of citrus growers at their villages
  - Demonstration of NRCC (National Research Centre for Citrus, Nagpur) technologies on citrus grower's orchard for quality fruit production through scientific method of management
  - Rejuvenation of declining citrus orchards

7. Technology Mission on Coconut

This mission was launched in 2001. It has 4 major components i.e.

- Development and adoption of technologies for management of pests and diseases affecting coconut gardens.
- Development and adoption of technologies for processing and product diversification
- Market research and Promotion.
- Technical support, external evaluation and Emergent requirements.

Financial assistance is provided in development, demonstration and adoption of technologies, as well as for market research and promotion upto 100% depending upon the cost of project and beneficiary.

8. Technology Mission on Oilseeds, Pulses and Maize (TMOP)

- The technology mission on oilseeds was launched in 1986, and later pulses and maize were added to it.
- The schemes included under TMOP are
  - Oilseeds Production Program (OPP)
  - National Pulses Development Program (NPDP)
  - Accelerated Maize Development Program (AMDP)
  - Post Harvest Technology (PHT)
  - Oilpalm Development Program (OPDP)
  - National Oilseeds and Vegetable Oils Development Board (NOVOD).
- In 2004, during 10th Plan period, OPP, OPDP, AMDP and NPDP were merged into Centrally Sponsored **Integrated Schemes of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM)**
- The special feature of this program is that flexibility has been provided to states in terms of fund utilisation and plan formulation, keeping regional diversity in mind.
  - States can introduce innovative measures as well to the extent of 10% of financial allocation
  - Private sector has also been involved
  - Fund diversion of up to 20% has been allowed from seed to non-seed component.

9. Jute Technology Mission

- This mission was launched in **Eleventh Plan period** (2006-07 to 2011-12, later extended to 2012-13) as a major initiative for overall development of Jute industry.
- The mission involves **4 mini missions**.
  - Mini Mission I to improve **yield and quality** by agricultural research and development in Jute sector. It is under Ministry of Agriculture.
  - Mini Mission II to transfer improved technology and practices in **production and post harvesting** phase. It is under Ministry of Agriculture.
  - Mini Mission III for providing **market linkage** of raw jute in all jute growing states. It is under Ministry of Textiles.
  - Mini Missions IV to **modernise jute industry, up gradation of skills and market promotion.** It is under Ministry of Textiles.

Minimum Support price of raw jute is fixed every year, and Jute Corporation of India is the nodal agency which procures jute. **West Bengal, Bihar and Assam** are the three major jute producing states in India.

10. Technology Mission on Cotton (TMC)

The mission was launched in 2000 with the objectives of improving the yield and quality of cotton through development of better cotton varieties and improved seeds, integrated water, nutrient and pest management technologies

- to increase the income of cotton growers by reducing cost of cultivation and increasing yield per hectare through transfer of technology, and
- to improve the quality of processing cotton by improving infrastructure and by modernising the factories and setting up new units.

TMC had four mini missions under it.

- Mini Mission I deals with **cotton research and technology development**
- Mini Mission II deals with **transfer of technology and development**. This mission has been **subsumed under National Food Security Mission-Commercial Crops (NFSM-CC)** from 2014-15 in major cotton growing states.

Student Notes:

- Mini Mission III and IV deal with development of market infrastructure and modernisation/setting up of new ginning and pressing factories respectively.
- Mini missions III and IV stand terminated from December 2010.

11. Sugar Technology Mission

- This mission was launched in 1994 with an objective to improve and upgrade the technology for Indian sugar Industry. It is a joint initiative of Directorate of Sugar & Edible Oils (Ministry of Consumer Affairs, Food & Public Distribution) and Department of Science & Technology.
- The purpose is to use latest environment friendly, cost effective technologies for achieving efficient sugar production through improvement in plant efficiencies, energy saving and reduced inputs.
- The mission has provided financial support to a number of new technologies and has successfully commercialised and replicated them to yield benefits in sugar recovery, improvement in quality etc. such as Ethanol from secondary juices, low pressure extraction, planetary gear box etc.

12. National Mission on Bio Diesel

- This mission was approved in 2009 with Department of Land Resource, Ministry of Rural Development as nodal agency.
- The mission was to be implemented in 2 phases i.e. Phase I as Demonstration Project and Phase II as Self Sustaining Expansion of Bio diesel program.
    - The Demonstration Phase (2006-07) has been taken under Mission Mode as a **Centrally Sponsored Scheme, implemented by State Governments**. 3lakh hectare plantations of bio diesel producing non edible oilseeds species (Jatropha or Ratanjot and Pongamia or Karanji) on degraded forest land and waste land was to be assessed by TERI and then only the mission was to be finally approved.
- The ultimate aim of the mission was supplementation of petroleum by bio diesel fuel to the extent of 20% by the end of phase II program (2011-12).
- The target was not achieved due to lack of sufficient Jatropha seeds to produce bio diesel.
- **The target of 20% bio fuel blending has been set to be achieved by 2017 which is yet to be achieved.**

13. National Mission on Food Processing

- This mission was launched in 2012 as a Centrally Sponsored Scheme to cater different aspects of this industry viz. modernisation of food processing industries, establishing of mega food parks, integrated cold chains and preservation and modernisation of abattoirs.
- Flexibility was allowed to State/UTs in implementing the scheme based on local needs.
- **This scheme was delinked from Central Government support in 2015 after 14th Finance Commission devolved more funds to States.**
- In 2017 Central Government has come up with **a new Central Sector Scheme Kisan Sampada Yojana for the period 2016-20** with Mega food Parks, integrated cold chain, agro-processing clusters etc. as components.

14. National Food Security Mission

The mission was launched in 2007 as a **Centrally Sponsored Scheme (**Ministry of Agriculture & Farmers Welfare) with a target to improve Rice production by 10 million tonnes, Wheat by 8 MT and Pulses by 2 MT.

Student Notes:

- During Twelfth Five year plan the mission was continued with a new target of additional production of 25 million tonnes of food grains comprising 10 MT Rice, 8 MT wheat, 4 MT pulses, and 3 MT of coarse cereals.
- NFSM during this period had 5 components i.e.
  - NFSM-Rice
  - NFSM-Wheat
  - NFSM-Pulses
  - NFSM-Coarse Cereals
  - NFSM-Commercial crops (Sugarcane, Jute, Cotton)
- **In NFSM during 2016-17, new initiatives to enhance production and productivity has been adopted such as free of cost distribution of seed mini kits of newer varieties of pulses, creation of seed hubs, bio fertilisers and bio agent labs, technological demonstration by KVKs etc.**
- The commercial crops component focuses on Cropping System Approach for transfer of technology in approved states.
- Training of farmers (4 sessions- before and during each seasons i.e. Kharif and Rabi) is also provided.

15. National Mission on Medicinal Plants

- The mission is implemented by National Medicinal Plant Board (*Ministry* of AYUSH) from 2008-09 and was later continued in Twelfth Five year Plan.
- This **Centrally Sponsored Scheme** is primarily aimed at supporting cultivation of medicinal plants on Private land with backward linkages, for establishment of nurseries for supply of quality planting material etc. and forward linkages for postharvest management, marketing infrastructure, certification, etc.
- From Year 2015-16, the National Mission on Medicinal Plants has been **merged with National AYUSH Mission as a component viz. "Medicinal Plants"** and is continuing with the same activities.

16. National Mission on Micro-Irrigation

- It was a Centrally sponsored scheme in which 40% cost of the MI system was borne by Central Government, 10% by State Government and remaining by the beneficiary herself.
- An additional 10% cost was borne by Central Government in respect of small and marginal farmers.
- Also, the assistance was limited to a maximum area of 5 hectare per beneficiary.
- This scheme was subsumed under National Mission on Sustainable Agriculture (NMSA) and implemented as "On Farm Water Management" during 2014-15.
- **The same is now implemented as "Per Drop More Crop" component under PMKSY from 2015-16 onwards.**

17. National Mission for Sustainable Agriculture (NMSA)

- This is one of the eight mission under NAPCC (National Action Plan for Climate Change).
- NMSA as a programmatic intervention is operational from 2014-15. It aims at making agriculture more productive, sustainable, and remunerative and climate resilient by
  - promoting location specific integrated farming system
  - soil and moisture conservation measures
  - comprehensive soil health management
  - efficient water management practices and
  - mainstreaming rainfed technologies.
- Rain-fed Area Development and Soil Health Management are its two components.

Student Notes:

18. Green Revolution – Krishonnati Yojana

It is an umbrella agricultural programme encompassing 11 schemes under it. It was launched during 12th Five Year Plan.

Cabinet Committee on Economic Affairs recently approved the continuation of this Umbrella Scheme from 2017-18 to 2019-20.

It aims to bring together 11 agricultural schemes besides their effective monitoring.

The schemes are:

- Mission for Integrated Development of Horticulture (MIDH)
- National Food Security Mission (NFSM)
- National Mission for Sustainable Agriculture (NMSA)
- Sub-Mission on Agricultural Mechanisation (SMAM)
- Integrated Scheme on Agricultural Marketing (ISAM).
- Submission on Agriculture Extension (SMAE)
- Sub Mission on Seeds and Planting Material (SMSP)
- Sub Mission on Plant Protection and Plant Quarantine (SMPPQ)
- Integrated Scheme on Agriculture Census, Economics and Statistics (ISACES)
- Integrated Scheme on Agricultural Cooperation (ISAC)
- National e-Governance Plan – Agriculture (NeGP-A).

These schemes look to develop the agriculture and allied sector in a holistic and scientific manner to increase the income of farmers by enhancing production, productivity and better returns on produce.

These schemes are aimed at creating and strengthening of infrastructure for production, reducing production cost and marketing of agriculture and allied products.

19. Previous Year Vision IAS GS Mains Test Series Questions

1. Enumerate some of the technology missions launched by Government of India and assess their impact on Indian Agriculture. What are the aims and objectives of National Mission on Agricultural Extension and Technology (NMAET)?2014-426

Answer:

As India is agriculture based economy with huge diversity in agro-climatic zones, the major objective behind launching various technology missions is to reduce the yield gap in laboratory and on field. So through these missions farmers are demonstrated new input methods along with credit incentives to encourage them to adopt new crops and technologies.

Some of the major missions are as follows:

1. The **National Food Security Mission (2007)** aims to bridge the yield gap in respect of paddy, wheat, pulses, millet and fodder. The Mission is being continued during 12th Five Year Plan with new targets of additional production of food grains of 25 million tons of food grains comprising of 10 million tons rice, 8 million tons of wheat, 4 million tons of pulses and 3 million tons of coarse cereals. The ongoing Integrated Development of Pulses Villages, Promotion of Nutri-cereals and Accelerated Fodder Development Programme were also merged in this Mission.
2. **National Mission on Sustainable Agriculture (2013)** including Micro Irrigation is being taken up as a part of the National Action Plan on climate change. The *Rainfed Area Development Programme* is merged in this Mission. Mission seeks to

transform Indian agriculture into a climate resilient production system through suitable adaptation and mitigation measures in domains of both crops and animal husbandry.

3. **The National Mission on Oilseeds and Oil Palm (2013)** was aimed at increasing production and productivity of oilseeds and oil palm. This would help in enhancing production of oilseeds by 6.58 million tonnes.
4. **The National Horticulture Mission (2005-06)** is a Centrally Sponsored Scheme (Centre – 85% & State- 15%) with a view to promote holistic growth of the horticulture sector through an area based regionally differentiated strategies, which include research, technology promotion, extension, post-harvest management, processing and marketing, in consonance with comparative advantage of each State/region and its diverse agro-climatic feature. In addition, mission is expected to promote horticulture diversification including an *initiative on saffron.*
5. The food processing sector has been growing at an average rate of over 8 per cent over the past 5 years. In order to have a better outreach and to provide more flexibility to suit local needs, a new centrally sponsored scheme **"National Mission on Food Processing"** was launched in cooperation with the State Governments in 2012-13.

Aims and Objectives of NMAET

The mission – approved in April, 2014 – under Agricultural Technology Management Agency (ATMA) aims,

- To restructure & strengthen agricultural extension to enable delivery of appropriate technology and improved agronomic practices to the farmers through interactive methods of information dissemination, use of ICT, capacity building & institution strengthening;
- To improve reach of farm mechanization to small and marginal farmers by various means including promotion of custom hiring centers;
- To make available quality seeds and increase Seed Replacement Ratio and
- To promote Integrated Pest Management and plant protection measures.

Uniquely, *Public-Private-Partnership* is encouraged in the Extension and Training components of the Mission.

The main objective of the mission is *to focus on adoption of appropriate technologies by farmers for improving productivity and efficiency in farm operations.*

2. Explain the role of agricultural extension in boosting agricultural productivity. Also, discuss in brief the importance of National Mission on Agricultural Extension & Technology.

Approach:

- Introduce by defining Agriculture extension.
- In brief explain its different types.
- Discuss Agriculture Extension can boost agricultural productivity.
- Highlight the importance of National Mission on Agricultural Extension & Technology.

Answer:

Agricultural extension can be defined as the "delivery of information inputs to farmers to increase agricultural productivity". It is the application of scientific research and knowledge to agricultural practices through farmer education.

Agriculture Extension services are of 3 types:

Student Notes:

Technology transfer – the traditional model of the transfer of advice, knowledge and information.

Advisory – the use by farmers of experts as a source of advice in relation to specific problems faced by them.

Facilitation – the aim is to help farmers to define their own problems and develop their own solutions.

Thus, different types of extension services help increase the agricultural productivity:

- By replacing traditional farming mechanisms by modern and advantageous systems
- By enabling pooling of resources to achieve economy of scale
- Changing attitude of farmers towards new and productive farming approaches
- Efficient utilisation of resources such as water, soil, pesticides, weedicides etc.

Even the UN High-Level Panel of Experts (HLPE) on food security and nutrition argues that the extension systems need full attention and investments from governments and the donor community.

Keeping in mind the benefits of agricultural extension services, the government launched National Mission on Agricultural Extension & Technology. To ensure easy availability of seeds, pesticide and machinery at reasonable prices, there are subject specific three Sub-Missions as well.

This mission also focuses on:

- Sustainable farm agriculture especially in rainfed areas, through integrated farming systems approach which incorporates natural resource management, minimizing external cost and maximizing return through value addition in crops, horticulture, livestock, fisheries etc.
- Capacity building of farmers, extension functionaries, institutions and other stakeholders is provided through knowledge centres.
- Partnering with knowledge generators public - private, formal and informal to collect and disseminate the knowledge through all channels.
- Development of difficult areas and disadvantage group of farmers need high priority as low yield in these areas results in low macro yield.
- The power of ICT has been fully leveraged for linking the mission from national to field level through farmers portal, Kisan call centres etc.
- Employment generation for youths on and off farm services through various interventions and programs. “Jai Kisan”- mobilization for farmers’ empowerment.
- Agrarian distress and conflicts, farmers’ agitations, indebtedness and other concerns also looked through action research project and linkages with other institutions.

3. Discuss the potential of Information and Communication Technology (ICT) to improve the livelihood of farmers in India. What are the initiatives taken by the government under 'National e-Governance Plan in Agriculture (NeGP-A)' in this regard?

Approach:

- The introduction should include link between ICT and agriculture or farmers.
- Then potential role should be enumerated in ICT in various areas associated with agriculture which in turn would improve livelihood of farmers.
- Finally, initiatives under NEGP-A should be enumerated.

Student Notes:

Answer:

Agriculture is an information intensive sector where farmers should be well versed in the latest farming technologies and business techniques. ICT plays an important role in addressing the challenges faced in management of natural resources & production of commodities.

The potential role of ICT in agriculture

- **Information dissemination throughout crop-cycle** - through technologies (like Satellite Communication, Geographic Information System (GIS), computer network, video and mobile phones) regarding weather conditions, input requirements like soil health, fertilizers etc. Example – DD kisan.
- **Increasing productivity** – by precision farming, popular in developed countries, which extensively uses IT to make direct contribution to agricultural productivity.
- **Agriculture marketing** - Awareness of up-to date information on prices for commodities, inputs and consumer trends help improve farmer's livelihood. For example National agriculture market is possible only due to ICT
- **Collectivization of producers** – to facilitate appropriate alliances and overcoming the barrier of small landholdings and achieving economies of scale. Example – farmer producer organizations.
- **New employment opportunities** - in rural sector- eg:- information kiosks .This will reduce the disguised unemployment.
- **Effective monitoring and analysis** – of agricultural performance through ICT to reduce losses at various levels of supply chain
- **Countering adverse effect of globalization** – by reducing the information asymmetry among farmers of different countries
- **Increasing effectiveness of government service delivery** – in quick estimation and timely compensation to farmers in wake of disaster. It ensures sowing area is not reduced in the next season.
- **Insurance:** PMKSY aims to assess the damage to crops for insurance purposes through satellite and Drone imagery. This will improve accuracy and compensation.

Started during 11th FYP, NeGP-A aims to achieve rapid development of agriculture in India through ICT enabled multiple delivery channels such as Internet, Government Offices, Touch Screen Kiosks, Krishi Vigyan Kendras , Kisan Call Centres, Agri-Clinics, Common Service Centers, Mobile Phones (Broadcast, IVRS, interactive messaging using unstructured Supplementary Service Data and Voice Recognition for ensuring timely access to agriculture related information for the farmers of the country.

Considering the potential of ICT in this sector government has taken many initiatives under NeGP-A. Some of which are as follows:-

- **Agricultural services** like Pesticide registration, Display on the Web of Seed Testing Results, Prices and arrival details, District level Agro-met advisories, Information on fertilizers/seeds/pesticides etc.
- **Mobile applications** for increasing awareness by providing information – Example: Kisan Suvidha, Pusha Krishi, India weather etc.
- **Development of web portals -** Farmers' Portal where a farmer can get information on a range of topics, mKisan Portal where officials and scientists can send targeted advisories to farmers, Crop Insurance Portal for complete information related to Crop Insurance scheme
- **e-Mandi**: has been launched to make procurement of agricultural products smoother and provide competitive remuneration, especially for small and marginal farmers.

Student Notes:

- **Modernisation of land records** - Many States have computerized their land records and are providing computerized copies of Records of Rights on demand. These states have also placed their land records data in public domain

Thus, ICT can play a major role in facilitating the process of transformation of rural India provided the existing bottlenecks are addressed soon.

4. Write short note on National Horticulture Mission.

National Horticulture Mission is a Centrally Sponsored Scheme to promote holistic growth of the horticulture sector through an area based regionally differentiated strategy. Presently, India is the 2nd largest producer of fruits & vegetables in the world. It aims to further enhance horticulture production, improve nutritional security and income support to farm households. Its objectives also includes promotion, development and dissemination of technologies, through a seamless blend of traditional wisdom and modern scientific knowledge and to create opportunities for employment generation for skilled and unskilled persons, especially unemployed youth.

MAJOR CROPS AND CROPPING PATTERN

Student Notes:

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Student Notes:

1. Cropping Pattern

Cropping pattern refers to the proportion of area under different crops at any given point of time in a unit area.

It indicates the temporal and/or spatial arrangement of crops in a particular area. There are different types of cropping patterns depending on the availability of various factors/resources (as discussed further).

Temporal Arrangements (time) refers to the yearly sequence of growing different crops on a piece of land. For example, if only one crop is grown on a particular land **year after year** (like rice in various floodplains) it is called Mono cropping.

Spatial Arrangements (space/land) refers to the arrangement of crop/s on a piece of land in various patterns. For example, if two crops are grown on a land in alternative rows it is called Row inter-cropping.

1.1. Cropping Systems

A cropping system is a **broader term** than cropping pattern and includes the sum total of all crops and the practices used to grow those crops on a field or farm. It comprises of all components, such as water, soil, technology etc. required for the production of a particular crop and the interrelationships between them and the surrounding environment.

For example, in a **Simple Cropping System** only one variety of crop is grown each year in the same field with regular fertilizer application to replenish the soil nutrients. While in a **Complex Cropping System** multiple crops like fruits, vegetables, tree crops, grain, fodder crops and livestock are all grown on a farm during a year with multiple harvests along with managed recycling of nutrients within the system.

While talking about cropping systems we tend to apply systems approach to crops.

Difference between Cropping Pattern and Cropping System

Cropping Pattern	Cropping System
Includes crop rotation practiced by a majority of farmers in a **given area or locality**.	Includes cropping pattern and its management to derive benefits from a **given resource base** under **specific environmental conditions**.
Type and **management of crops** in time and space.	The cropping patterns used on a farm and **their interaction with farm resources**, other farm enterprises and available technology which determine their make-up.
Yearly sequence and spatial arrangement of crops or crops and fallow on a given area. The **proportion of area** under various crops at a point of time in a unit area	Pattern of crops taken up for a given piece of land, or **order in which crops are cultivated** on a piece of land over a fixed period, **associated with** soil, management practices such as tillage manuring and irrigation
The two concepts are, however, overlapping, in various ways.	

1.2. Significance of Cropping System

All around the world, different variations are adopted in agriculture, which have some **common associated benefits,** such as:

- **Maintain and enhance soil fertility**: Growing of different crops such as nitrogen fixing leguminous crops enhance the nitrogen content of soil. Growing of perennial forages and millets help to enhance soil organic content.
- **Minimize spread of diseases**: It encourages biodiversity by providing a habitat for a variety of insects and soil organisms. Some of them may act as predator for the certain diseases, thus limiting the outbreaks of diseases.
- **Inhibit pest and insect growth**: It reduces the homogeneity of farm. This heterogeneity increases the barriers against biological dispersal of pests in the field.

- **Control weed**: It reduces the likelihood that specific weed species will become adapted to the system and become problematic. For example, *rotation of crops is the most effective means yet devised for keeping land free of weeds.*
- **Use resources more effectively**: Multiple activities, if scientifically planned, lead to better usage of resources. For example, fodder crops can be used for livestock feed, animal dung can be used as organic manure and dairy products helps to enhance farmer's income.
- **Reduce risk for crop failure**: Different crops have different response to the climate vagaries and varied degree of susceptibility to disease attack. Due to such heterogeneity, the risk of total crop failure is reduced.
- **Improved food and financial security**: By reducing the risk of crop failure & diversifying the income opportunities for the famers, scientifically designed cropping system improves food and financial security.

1.3. Factors Affecting the Cropping Pattern

Crop diversification refers to the addition of new crops or cropping systems to agricultural production on a particular farm taking into account the different returns from value-added crops with complementary marketing opportunities

The cropping pattern and crop diversification in a particular geographical area depends on different categories of factors. All the factors vary in their impact on the crops under different circumstances and times. These factors have been differently classified by different researchers/ institutions. For example, World Bank (1990) has put forward a detailed list of factors under the broad categories of agronomic, economic and policy factors in this regard as determinants of cropping system strategies as mentioned in the table below.

All these factors are interrelated and their relative importance changes over time.

Agronomic, Economic and Policy Factors

Agronomic/Technical	Economic	Government Policy
• Climate and soil type (irrigation, topography, fertility, drainage etc.) • Availability of required inputs (fertilizer, chemical, credit, tractors etc.) • Plant/seed of high genetic quality. • Management techniques and quality managers. • Abundance of labour.	• Flow of market signals and communication and information systems, for example, regarding prices in the market, supply –demand etc. • Venture capital and entrepreneurship. • Transparency of input and output prices. • Information on export standards, market demand and relative profitability. • Efficient marketing systems.	• Non-distortionary policy to avoid discrimination among crops. (eg. MSP Policy) • Efficient research and extension programmes, without any bias for major crops or against high value crops. • Contract-farming opportunities • Rural credit. • Off-farm employment opportunities. • Marketing systems including quality standards. • Involvement of the private sector.

(Source: World Bank (1990)

1.4. Types of Cropping Systems

Crop rotation: Crops are changed in the field from year to year according to a planned sequence rather than the same crop being grown in the same field again and again.

1.4.1. Mono-Cropping

Mono-cropping or monoculture refers to growing of only one crop on a piece of land year after year.

- It may be due to **climatic and socio-economic conditions** or due to **specialisation of a farmer** in growing a particular crop. For example, groundnut or cotton or sorghum are grown year after year due to limitation of rainfall, while in canal irrigated areas, under a waterlogged condition, rice crop is grown as it is not possible to grow any other crop.

Student Notes:

1.4.2. Multiple Cropping

It is the practice of growing two or more crops in the same field within a given year.

- It is the intensification of cropping in time and space dimensions, i.e., **more number of crops** within year and more number of crops on same piece of land in any given period.
- It includes **mixed-cropping, inter-cropping and sequence cropping**.

A. Mixed Cropping: Two or more crops grown in the same field within a given **year without a definite row arrangement**. It is a common practice in most of dry land tracts of India. Seeds of different crops are mixed in certain proportion and are sown.

- The objective is to meet the family requirement of cereals, pulses and vegetables. Ex: sorghum, pearl millet and cowpea are mixed and broadcasted in rain-fed conditions.

B. Inter-cropping: It includes growing two or more crops simultaneously **with definite row arrangement** on the same field with an objective of higher productivity per unit area in addition to stability in production.

- It was earlier practiced as an insurance against crop failure under poor rainfall conditions. If done unscientifically, it might lead to intercrop competition for available resources.

Requirements for successful Inter-cropping:

- The timing of peak nutrient demands of component crops should not overlap.
- Competition for light should be minimum among the component crops.
- The difference in maturity of component crops should be at least 30 days.

Types of Intercropping: Combinations of various crops can vary in terms of spatial or temporal arrangement. On the basis of these variations, following types of intercropping have been identified.

1. **Row intercropping:** Growing two or more crops **simultaneously** where one or more crops are planted in rows. It is a **variation in space dimension**. For example, maize + greengram (1:1), maize + blackgram (1:1), groundnut + redgram (6:1)
   - Variations include alley cropping, where crops are grown in between rows of trees, and strip cropping, where multiple rows, or a strip, of one crop are alternated with multiple rows of another crop.
2. **Strip-intercropping**: Two or more crops are planted in the same field in **alternate strips**.
   - Strips are wide enough to permit independent cultivation but narrow enough for the crops to interact. Ex. groundnut + redgram (6:4) strip.

Advantages of intercropping

- It leads to **better use** of growth resources including light, nutrients and water.

Cropping Intensity

It refers to **number of crops cultivated** in a piece of land per annum.

Cropping Intensity = Gross Cropped Area / Net Sown Area x 100

Gross Cropped Area (GCA) is the **total area sown** once as well as more than once in a particular year. When the **crop** is **sown** on a piece of land for twice, the **area** is counted twice in GCA. On the other hand, **Net Sown Area** is the **area sown** with crops but is counted only once.

In Punjab and Tamil Nadu, the cropping intensity is more than 100% (i.e. around 140-150%). In Rajasthan, the cropping intensity is less.

Need for intensive cropping

- The increase in population has put pressure on land to increase productivity per unit area, unit time and for unit resource used.
- Moreover, for efficient use of available natural resources, the cropping system has to evolve with change in climate, soil and water availability.
- Thus, cropping system should provide enough food for the family, fodder for cattle and generate sufficient cash income for domestic and cultivation expenses.

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- Intercropping of compatible plants also **encourages biodiversity** by providing a habitat for a variety of insects and soil organisms that would not be present in a single-crop environment. This in turn can help **limit outbreaks of crop pests** by increasing predator biodiversity.
- Along with **suppression of weeds** it causes **yield stability** - even if one crop fails due to unforeseen situations, another crop will yield and gives income.
- Successful intercropping gives **higher equivalent yields** (yield of base crop + yield of intercrop), higher cropping intensity.
- It reduces pest and disease incidences and improves soil health and agro-ecological system.
- Reducing the homogeneity of the crop increases the barriers **against biological dispersal of pest** organisms through the crop.

Mixed Cropping vs Intercropping	
Mixed Cropping	**Intercropping**
Aimed to minimize the risk of crop failure	Aimed to increase productivity from unit area
Seeds of different crops are mixed together before sowing	Seeds are not mixed
All the crops are sown at the same time.	Crops can be sown at the same or different time.
Crop sowing is random.	Different crops are grouped in different rows or columns.
Pest control is relatively difficult.	Pest control is relatively easier.
Equal emphasis is given to all the crops.	More emphasis is given to main crops.
Same fertilizer and pesticide is applied to all crops.	Specific fertilizer and pesticide is applied to each crops.

C. Sequence Cropping or Sequential Cropping or Crop Rotation:

- It can be defined as growing of two or more **crops in a sequence on same piece** of land in a farming year. The succeeding crop is planted after the preceding crop has been harvested.
- Crop variation is done **with respect only to time**. There is **no intercrop competition**. Its various types are:
  - **Double Cropping:** Growing two crops on the same land in a year in sequence(across time). Ex. rice→cotton
  - **Triple Cropping:** Growing three on the same land in a year in sequence. Ex. Triple cropping: rice→rice→pulses
  - **Quadruple:** Growing four crops on the same land in a year in sequence. Ex. tomato→ridge gourd→amaranthus greens→baby corn.

  (NOTE: The various terms defined above bring out essentially two underlying principles of growing crops simultaneously in mixture, i.e., intercropping; and of growing individual crops in sequence, i.e., sequential cropping. The cropping system for a region or farm may comprise either or both of these two principles).

D. Other Types of Multiple Cropping

Alley cropping: It is planting rows of trees at wide spacing with a companion crop grown in the alleyways between the rows.

- It diversifies the sources of farm income, improves crop production and provide protection and conservation benefits to crops.
- Common examples of alley cropping plantings include wheat, corn, soybeans or hay planted in between rows of black walnut or pecan (a type of walnut) trees.

Relay Cropping: Growing two or more crops simultaneously during the part of the life cycle of each.

Student Notes:

- The second crop is planted after the first crop has reached its reproductive stage of growth, but, before it is ready for harvest. Ex: rice fallow pulses i.e pulses gown on land where rice is nearing its harvest season.
- This allows farmers to grow two crops in one season in places where the growing season is not long enough to accommodate two crops.

Ratoon cropping: Ratooning is a method of harvesting a crop which leaves the roots and the lower parts of the plant uncut to give the ratoon or the stubble crop. Crop regrows out of roots or stalks after harvest of crops.

- The main benefit of ratooning is that the crop matures earlier in the season. Ratooning can also decrease the cost of preparing the field and planting.
- However, this method cannot be used endlessly as the yield of the ratoon crop decreases after each cycle.
- Ratooning is most often used with crops which are known to give a steady yield for three years under most conditions eg sugarcane, banana, pineapple.

2. Major Crops in India

Crop	Characteristics	Climatic Condition	Remarks/Distribution
Rice	Staple food crop of India. Kharif Crop Aus, Aman and Boro are varieties of rice in Kharif, Rabi and Zaid seasons.	High temperature (above 25° C) High Humidity with average rainfall above 100 cm	Plains of North and North-Eastern India, coastal areas and the deltaic regions Punjab, Haryana, West UP and Parts of Rajasthan (with help of irrigation)
Wheat	Second most important crop Main food crop in north and north-western India Rabi Crop	Requires a cool growing season and a bright sunshine at the time of ripening. Winter temperature from 10°-15° C and summer temperature from 21°-26° C 50-75 cm of annual rainfall evenly distributed over the growing seasons	The Ganga-Satluj plains in the northwest and black soil region of the Deccan. The major wheat-producing states are Punjab, Haryana, Uttar Pradesh, Bihar, Rajasthan and parts of Madhya Pradesh.
Millets	Jowar, bajra and ragi are important millets in India. Have high nutritional value	Jowar is a rain-fed crop mostly grown in the moist areas which hardly needs irrigation. (Kharif- 26°-33° C; Rabi- above 16°C) Bajra grows well on sandy soils and shallow black soil. (Temperature- 25°-30° C, rainfall- 40-50 cm) Ragi is a crop of dry regions and grows well on red, black, sandy, loamy and shallow black soils. (Temperature- 20°-30° C; rainfall- 50-100 cm)	Major Jowar producing States were Maharashtra, Karnataka, Andhra Pradesh and Madhya Pradesh. Major Bajra producing States were: Rajasthan, Uttar Pradesh, Maharashtra, Gujarat and Haryana. Major ragi producing states are: Karnataka, Tamil Nadu, Himachal Pradesh, Uttarakhand, Sikkim, Jharkhand and Arunachal Pradesh.
Maize	Is used both as food and fodder.	Temperature between 21°C to 27°C and grows well in	Major maize-producing states are Karnataka, Uttar Pradesh, Bihar,

Student Notes:

	Kharif Crop. In some states like Bihar- Rabi crop also.	old alluvial soil. 50-100 cm rainfall Requires four and a half frost free months in a year	Andhra Pradesh, Telangana and Madhya Pradesh
Pulses	Major source of protein in a vegetarian diet. Tur (arhar), urad, moong, masur, peas and gram are major pulses in India.	less moisture and survive even in dry conditions. Gram prefers 20°-25° temperature and 40-50 cm rainfall	Major pulse producing states in India are Madhya Pradesh, Uttar Pradesh, Rajasthan, Maharashtra and Karnataka. Being leguminous crops, all these crops except arhar help in restoring soil fertility by fixing nitrogen from the air.
Sugarcane	Tropical as well as subtropical crop. Main source of sugar, gur (jaggary), khandsari and molasses.	Hot and humid climate with a temperature of 21°C to 27°C and an annual rainfall between 75cm and 100cm Can be grown on a variety of soils and needs manual labour from sowing to harvesting	The major sugarcane-producing states are Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh, Telangana, Bihar, Punjab and Haryana.
Tea	Plantation Crop	Grows well in tropical and sub-tropical climates endowed with deep and fertile well-drained soil, rich in humus and organic matter. Ideal temperature- 20°-30° C Requires warm and moist frost-free climate all through the year. Frequent showers (150-300 cm) evenly distributed over the year ensure continuous growth of tender leaves	Tea is a labour-intensive industry. It requires abundant, cheap and skilled labour. Major tea-producing states are Assam, hills of Darjeeling and Jalpaiguri districts, West Bengal, Tamil Nadu and Kerala. Himachal Pradesh, Uttarakhand, Meghalaya, Andhra Pradesh and Tripura are also tea-producing states in the country.
Coffee	The Arabica variety initially brought from Yemen is produced in the country.	Requires hot and humid climate with temperature varying between 15°-28° C and rainfall from 150-250 cm	Intially its cultivation was introduced on the Baba Budan Hills and even today its cultivation is confined to the Nilgiri in Karnataka, Kerala and Tamil Nadu.
Rubber	Equatorial Crop, but under special conditions Also grown in tropical and sub-tropical areas.	Moist and humid climate with rainfall of more than 200 cm. and temperature above 25°C.	Mainly grown in Kerala, Tamil Nadu, Karnataka and Andaman and Nicobar islands and Garo hills of Meghalaya.
Cotton	Fibre Crop Kharif Crop and requires 6 to 8 months to mature. Cotton grows well in drier parts of the black cotton soil of the Deccan Plateau.	It requires high temperature (21° -30° C), light rainfall (50-100 cm) or irrigation, 210 frost-free days and bright sun-shine for its growth.	Major cotton-producing states are– Maharashtra, Gujarat, Madhya Pradesh, Karnataka, Andhra Pradesh, Telangana, Tamil Nadu, Punjab, Haryana and Uttar Pradesh.

Student Notes:

Jute	Known as Golden fibre	Grows well on well-drained fertile soils in the flood plains where soils are renewed every year. High temperature is required during the time of growth	Major jute producing states are West Bengal, Bihar, Assam, Odisha and Meghalaya.

3. Cropping System in India

3.1. Evolution

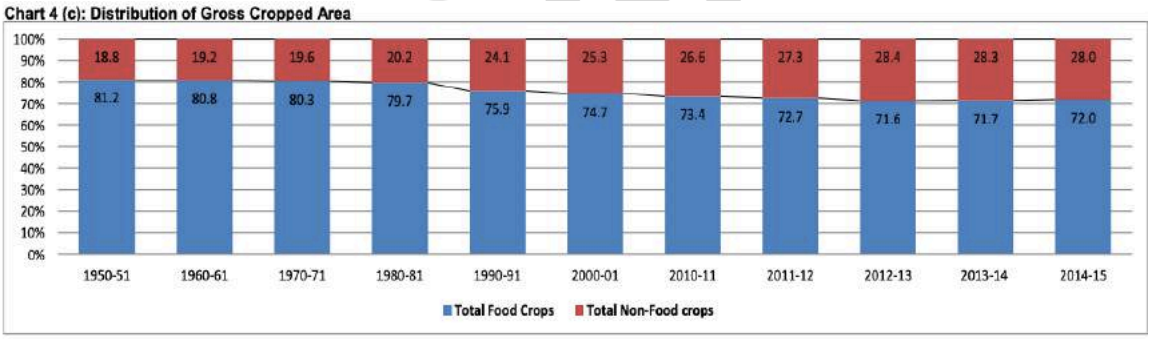
The cropping system of a region is a **cumulative result** of long term agricultural practices, social customs and traditions, physical conditions, Government policies, monetary considerations and historical factors. In India, over last 50 years, the trend in the land use pattern and cropping pattern has shown increasing use of land for the purpose of cultivation with slight variations.

The change in land use pattern and cropping pattern is vastly affected by irrigation expansion, infrastructure development, penetration of rural markets, development and spread of short duration and drought resistant crop technologies, rapid urbanization. The higher cultivable area has been achieved by bringing large acreage of uncultivable land into cultivation.

Some of the **observable trends/issues in Indian agriculture system** can be seen as under:

- **Dominance of food crops over non-food crops**

  At the time of Independence, over 80% of the gross cropped area in the country was devoted to the production of food crops.



Source: Directorate of Economics & Statistics, DAC&FW

Reason: Gradually with commercialization of agriculture, farmers in India have started shifting area to non-food crops mainly due to relatively better price realization.

- **Variety of Crops**

  Almost every kind of crops are grown in India as it is endowed with a variety of soils. Cash crops have gradually cached up with the production of food crops and more and more farmers are moving from subsistence to commercial farming.

  Horticulture crop production (305.4 MT in 2017-18) has recently overtaken the total foodgrain (279.5 MT in 2017-18) production in India. Besides, **medicinal plants, fruits, flowers and vegetables** are gradually getting special attention due to their demand in food processing and export potential.

  Plantation crops are highly profitable but require huge capital and large tracts of land. Thus it is confined to limited parts of country. Emphasis is placed now on **production of oilseeds** through various initiatives like Integrated Scheme of Oilseeds, Pulses, Maize and Oilpalm (ISOPOM).

Student Notes:

Reason: After ensuring the food security, now the policy emphasis is on increasing farmers income, boost exports, save foreign exchange spent on import of edible oils.

- **Dominance of cereals among food crops**

  Within broad group of food crops, cereals like wheat and rice dominate. About 82 per cent of the area under food crops has been put to cultivation of cereals.

  Reason: This is due to better prices, less risk in production and the availability of better seeds.

- **Decline in coarse cereals**

  Jowar, Bajra, Maize, Millets, Barley etc. are called coarse or inferior cereals. The area under these crops to the total area under cereal crops has declined significantly from 48 per cent in 1950-51 to about 25 per cent in 2016.

  Reason: This is due to spread of irrigation facilities, improved inputs and a shift in consumption patterns of the people.

- **Declining importance of Kharif crops**

  The share of Kharif has declined from 71 per cent in the 1970's to 49 percent in 2015-16. The share of Rabi foodgrain production in total foodgrain production of the country has increased from 36.4% in 1970-71 to 50.83% in 2015-16.

  Reason: The Kharif crops are not reliable because they are mostly **dependent on monsoon rainfall** which in itself is unreliable. Contrary to this, mostly Rabi crops in India are raised on irrigation which offers a degree of reliability.

3.2. Categories of Crops in India

Crops can be categorized differently based on end usage and on the growing season.

3.2.1. Based on End Usage

Food Crops	Cash Crops	Plantation Crops	Horticulture crops
These are the crops which are **grown as food for the producer's family** or for the producer's own livestock. Example wheat, rice, jowar etc. The scale of operations is quite small so as to fulfil the basic needs of a family.	Cash Crops are crops that are especially **used for profit** rather than consumption by a family. They can be consumed directly or processed into other products, such as sugar and biofuel. They consist of foods like tobacco, tea, coffee, cardamom, fruits and vegetables, grains, etc. They are sold, but **some are not edible**. Cotton and tobacco are examples of non-edible cash crops.	A plantation is a **large-scale farm** that specializes in cash crops. The term Plantation crops refers to those crops which are usually cultivated as a **single crop on an extensive scale** in a large contiguous area, owned and managed by an Individual or a company. These plantation crops are **high value commercial crops** of greater economic importance The crops include tea, coffee, rubber, cocoa, coconut, arecanut, oil palm, cashew, cinchona etc.	Horticulture is the science and art of **growing and caring for plants**, especially flowers, fruits, and vegetables. The word horticulture comes from Latin and means "garden cultivation." Whereas agronomy (a branch of agriculture) refers to the growing of field crops, horticulture refers to **small-scale gardening**.
***All food crops can be cash crops but not all cash crops can be food crops. Food crops can be eaten by someone somewhere and so have a cash value. Food crops can be sold, which would make them cash crops as well. *Kindly note that the Plantation and Horticultural crops are a subset of food/cash crops.			

Student Notes:

3.2.2. Based on Seasons

There are three distinct crop seasons namely Kharif, Rabi, and Zaid.

- **Kharif season** largely coincides with Southwest Monsoon and corresponds to the rainy season.
- **Rabi season** begins with the onset of winter in October-November and ends in March-April. The low temperature conditions during this season facilitate the cultivation of temperate and subtropical crops such as wheat, gram and mustard.

The area under Rabi crops is 22.4% less than under Kharif crops.

- **Zaid** is a short duration summer cropping season beginning after harvesting of rabi crops and the sowing of the Kharif crops**.** The cultivation of watermelons, cucumbers, vegetables and fodder crops during this season is done on irrigated lands.

Cropping season	**Major crops cultivated**	
	Northern States	**Southern States**
Kharif June-September	Rice, Cotton, Bajra, Maize, Jowar, Tur	Rice, Maize, Ragi, Jowar, Groundnut
Rabi October-March	Wheat, Gram, Rapeseeds and Mustard, Barley	Rice, Maize, Ragi Groundnut, Jowar
Zaid April-June	Vegetables, Fruits, Fodder	Rice, Vegetables, Fodder

However, this type of distinction in the cropping season **does not exist in southern parts** of the country. Here, the temperature is high enough to grow tropical crops during any period in the year provided the soil moisture is available. Therefore, in this region same crops can be grown thrice in an agricultural year provided there is sufficient soil moisture.

3.3. Cropping Patterns in India

Different parts in India follow different cropping patterns during a year. It is largely due to variations in physical factors, size of land holdings, market facilities, government policies, infrastructure facilities etc. These factors are discussed below.

Crop diversification and intensification depends on various factors related to:

- **Soil and climatic parameters:** It determines overall agro-ecological setting
- **Resource:** It covers irrigation, rainfall and soil fertility
- **Technology:** Varieties of seeds, cultural requirements, mechanization, plant protection, and access to information etc.
- **Infrastructure facilities:** Irrigation, transport, storage, trade and marketing, post-harvest handling and processing etc.
- **Condition of Household**: Food and fodder self-sufficiency requirement as well as investment capacity.
- **Socio-economic conditions:** Financial resource base, land ownership, size and type of land holding, household needs of food, fodder, fuel, fibre and finance, labour availability etc.
- **Pricing Structure:** It includes output and input prices as well as trade policies and other economic policies that affect these prices either directly or indirectly.
- **Institutions:** It covers farm size and tenancy arrangements, research, extension and marketing systems and government regulatory policies.

Apart from this the **factors determining the choice of crops by a farmer** may depend largely on:

- **Size of the Land Holding:** In India marginal and small farmers represent the majority of farming community. So the mono crop paddy has become predominant as it fulfils the household needs and perpetuates the subsistence agriculture with little scope for commercial Cop husbandry.

- **Literacy:** Majority of the farmers are ignorant of the scientific methods involved in mixed-cropping, mono cropping and other technological knowhow for practicing better
- **Disease and pest:** The cropping pattern also depends on the possibility of disease and pest infections.
- **Ecological Suitability:** The cropping pattern of a particular region is highly dependent on the ecological condition (temperature, rainfall, humidity, etc.).
- **Moisture Availability:** The source of irrigation greatly determines the type of the cropping pattern to be practiced. For example, in low rainfall area, dry land farming is best possible way to profit maximisation.
- **Financial Stability:** The economic condition of the farmers also affects the cropping pattern. As the cash crops (for example, cotton) involve high capital investments, these are practised only in estate farming. The marginal section of the farms community adopts low cost crops.

Examples of Cropping Patterns Followed in India

Major categories of cropping pattern followed in India are-

Kharif (monsoon crops)		**Rabi** (post-monsoon crops)	
Rice based	**Non-Rice-Based**	**Wheat and Gram Based**	**Rabi-Jowar Based**
Relay Cropping - seed of succeeding crops like lentil, gram, pea, lathyrus, berseem, linseed etc. is sown through broadcasting in maturing rice crop. It is done in both upland and lowland rice culture*. **Mixed varietal cropping of rice** - Mixing the seeds of early rice (ahu) with late maturing deep water rice (bao). It is mainly practiced in West Bengal.	Maize-based Bajra-based Cotton-based	These two crops are grown under identical climate and can often be substituted for each other.	Along with Jowar, bajra, pulses, oilseeds and tobacco are grown as alternative crops.

3.4. Major Agricultural Regions or Zones of India

On the basis of some homogeneity and commonness, major crop regions in India may be divided as follows:

- Rice Region
- Wheat Region
- Jowar-Bajra Region
- Cotton Region
- Millet and Maize Region
- Fruit and Spice Region

> ***Upland rice*** is grown in rainfed, naturally well-drained soils with bunded or unbunded fields without surface water accumulation.
>
> ***Lowland rice*** is grown on land that is flooded or irrigated.

Rice region

Rice is considered as the major crop in the vast region stretching from lower Gangetic plain to Brahmaputra valley in the east and the circum-coastal alluvial tracts of the peninsula region. Though rice displays overall dominance, considering the secondary importance of other crops, this region may be subdivided into following zones:

- Rice-Jute-Tea: This association of crops occurs in far east, near Assam Valley, north-west Bengal and lower Gangetic plains.
- Rice-Pulses-Millets-: This association occurs in the western section of the former zone, covering central Bihar, eastern Madhya Pradesh and eastern Uttar Pradesh.
- Rice-Millets: This zone comprises the entire Andhra Pradesh, southern Orissa and some parts of Tamil Nadu.

Student Notes:

- Rice-Coffee-Spices: This zone is found in the southern extremity of Kerala and Tamil Nadu.

Wheat region

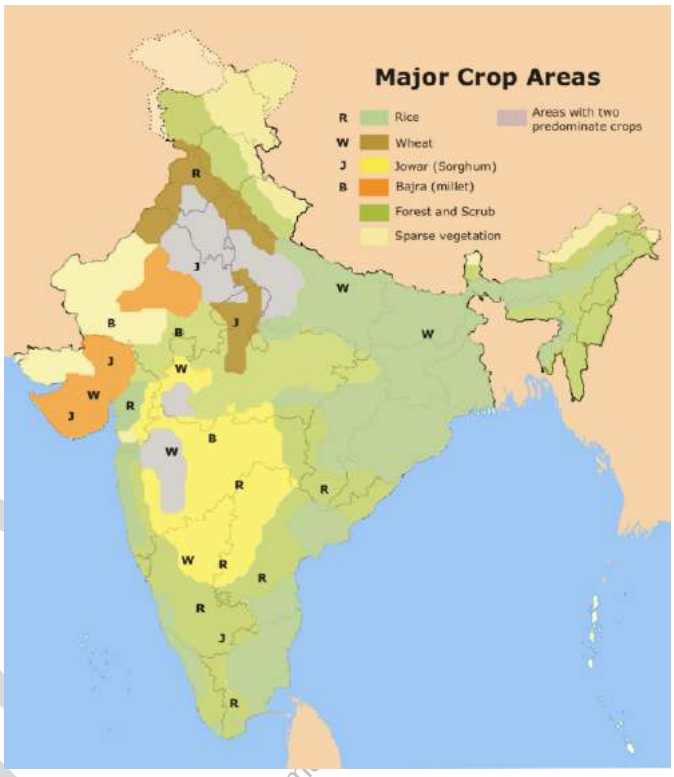
This region covers the entire north-western India including the state of Punjab, Haryana, Uttar Pradesh and Rajasthan. The major sub-regions are:

Other wheat based systems:
- Wheat –chickpea
- Wheat-rice-wheat
- Wheat-green manure-wheat
- Wheat-fallow-wheat

- Wheat-Maize-Sugarcane: This region comprises a great part of wheat regions, covering West Uttar Pradesh, Himachal Pradesh and Jammu.
- Wheat-Jowar-Bajra in Indus Plain covering Punjab and Haryana.
- Wheat-Jowar-Bajra in Vindhyan scarp land and Malwa Bundelkhand plateau.

Jowar-Bajra Region

This crop combination is practised in drought prone region (rainfall 50-100 cm).



- Jowar-Cotton in Maharashtra.
- Jowar-Cotton-Oilseeds-Millets in Karnataka and Maharashtra.
- Jowar-Wheat in entire Rajasthan, Haryana and some parts of Uttar Pradesh.
- Bajra-Jowar-Pulses in Rajasthan desert and semi-desert areas.

Cotton Region

Cotton cultivation predominates in the black cotton soil (regur) region in the North West India. It covers the Deccan trap region and Gujarat plain. The Narmada, Tapti, Purna, Sabarmati River Valleys are basically heartlands of cotton cultivation. As a cash-crop, cotton cultivation is always associated with one food grain cultivation, preferably Jowar, Bajra or oil seeds. The different sub-regions are:

- Cotton-Jowar-Bajra grows in close association with one another in the Maharashtra and Western Madhya Pradesh.
- Cotton-Oilseeds combination developed in Gujarat.
- Cotton-Pulses-Rice region developed in Narmada banks and Eastern Gujarat.

Millet-Maize Region

The cultivation of millet, maize and ragi are found in close association with other major cereals like bajra, wheat, rice etc. Maize cultivation dominates in Rajasthan, Gujarat, and Madhya Pradesh. In Himachal Pradesh, Maize-Barley-wheat combination has developed, particularly in the foothills of the Himalayas. Some parts of the Aravalli have

the peculiar crop combination of Maize-Cotton-Oilseeds-Millets-Wheat. Ragi cultivation predominates in South of Karnataka.

Maize based cropping systems

- Maize has wide adaptability and compatibility under diverse soil and climatic conditions.
- It is cultivated in sequence with different crops under various agro-ecologies of the country
- Among different maize based cropping systems
  - Maize-wheat ranks 1st having 1.8 m ha area mainly concentrated in rainfed ecologies.
  - Maize-wheat is the 3rd most important cropping systems (after rice-wheat and rice-rice that contributes about 3 % in the national food basket.)

Rice-maize has emerged a potential maize-based cropping system in peninsular and eastern India. Compared to existing cropping systems like rice-wheat and rice-rice, maize based cropping systems are better user of available resources and the water use efficiency of maize based cropping systems is about 100 to 200 % higher at different locations.

Related Information

Agro-ecological/climatic zoning (AEZ)

It defines zones on the basis of **combinations of soil, landform and climatic** characteristics. The particular parameters used in the definition focus attention on the climatic and edaphic requirements of crops and on the management systems under which the crops are grown. Each zone has a similar combination of constraints and potentials for land use and serves as a focus for the targeting of recommendations designed to improve the existing land-use situation, either through increasing production or by limiting land degradation.

With the 329 million hectares of the geographical area the country presents a large number of complex agro-climatic situations. Several attempts have been made to delineate major **agro-ecological regions in India** for macro-level planning on a more scientific basis. They are as follows.

- Agro-climatic regions by the Planning Commission
- Agro-climatic zones under National Agricultural Research Project (NARP)
- Agro-ecological regions by the National Bureau of Soil Survey & Land Use Planning (NBSS & LUP)

Fruit & Spice Region

This is the **smallest region** among the different crop regions. High-altitude hilly areas come under the territory of this region. The 'Duns' and valleys in Himalayas, foothills of Nilgiri, Annamalai, Palni and Cardamom hills in Tamil Nadu and Kerala may be classified as fruit and spice region. Here, the dominant agricultural activity is fruit orchards and plantations.

Plantation and Other Commercial Crops

Crops under this category include sugarcane, tobacco, potato, jute, tea, coffee, coconut, rubber and other crops, such as spices and condiments. Some of them are seasonal, some annual and some perennial. Most of them require specific environmental conditions and from the point of view of cropping patterns, they are concentrated in some particular regions. Besides, certain horticultural crops, such as apple, mango and citrus, are important.

In the case of plantation-crops, intercropping with pulses and fodder crops is common. Spices and condiments are generally grown on fertile soils. Chillies are rotated with jowar, whereas onion, coriander, turmeric and ginger are grown as mixed crops with other seasonal crops.

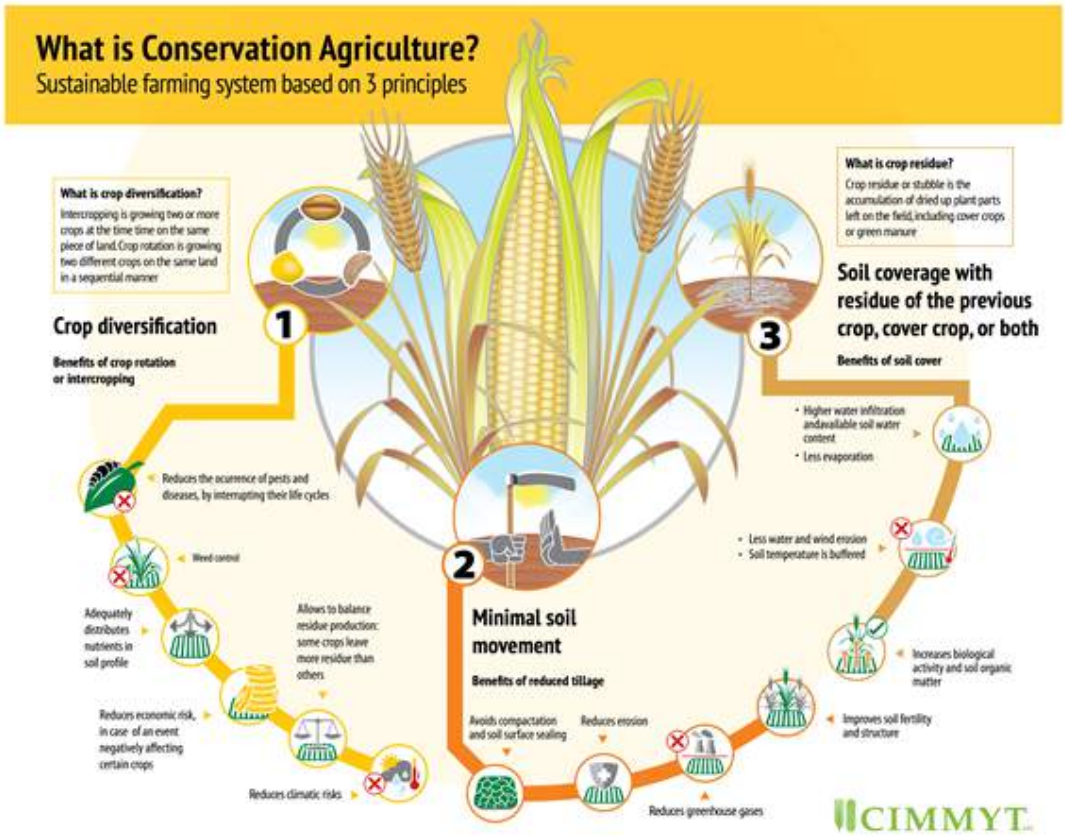
4. Miscellaneous

4.1. Conservation Agriculture

Conservation Agriculture (CA) is a farming system that can prevent losses of arable land while regenerating degraded lands. It promotes maintenance of a permanent soil cover, minimum soil disturbance, and diversification of plant species.

Student Notes:

- It **conserves natural resources, biodiversity and labor**. It increases available soil water, reduces heat and drought stress, and builds up soil health in the longer term
- It is based on the interrelated **principles** of minimal mechanical soil disturbance, permanent soil cover with living or dead plant material, and crop diversification through rotation or intercropping. It helps farmers to maintain and boost yields and increase profits, while reversing land degradation, protecting the environment and responding to growing challenges of climate change.
- To reduce soil disturbance, farmers practice **zero-tillage farming**, which allows direct planting without plowing or preparing the soil. The farmer seeds directly through surface residues of the previous crop.
- **Zero tillage is combined with intercropping and crop rotation**, which means either growing two or more crops at the same time on the same piece of land, or growing two different crops on the same land in a sequential manner. These are also core principles of sustainable intensification.



4.1.1. Benefits and challenges of conservation agriculture

- Zero-tillage farming with residue cover saves irrigation water, gradually increases soil organic matter and suppresses weeds, as well as reduces costs of machinery, fuel and time associated with tilling. Leaving the soil undisturbed increases water infiltration, holds soil moisture and helps to prevent topsoil erosion. Conservation agriculture enhances water intake that allows for more stable yields in the midst of weather extremes exacerbated by climate change.
- While conservation agriculture provides many benefits for farmers and the environment, farmers can face **constraints** to adopt these practices. Wetlands or soils with poor drainage can make adoption challenging. When crop residues are limited, farmers tend to use them for fodder first, so there might not be enough residues for the soil cover. To initiate conservation agriculture, appropriate seeders are necessary, and these may not be available or affordable to all farmers. Conservation agriculture is also knowledge intensive and not all farmers may have access to the knowledge and training required on how to

practice conservation agriculture. Finally, conservation agriculture increases yields over time but farmers may not see yield benefits immediately.

- However, innovations, adapted research and new technologies are helping farmers to overcome these challenges and facilitate the adoption of conservation agriculture.

4.1.2. Conservation agriculture and Climate-smart agriculture

- While conservation agriculture and climate-smart agriculture are similar, their purposes are different. Conservation agriculture aims to sustainably intensify smallholder farming systems and have a positive effect on the environment using natural processes. It helps farmers to adapt to and increase profits in spite of climate risks.
- Climate-smart agriculture aims to adapt to and mitigate the effects of climate change by sequestering soil carbon and reducing greenhouse gas emissions, and finally increase productivity and profitability of farming systems to ensure farmers' livelihoods and food security in a changing climate. Conservation agriculture systems can be considered climate-smart as they deliver on the objectives of climate-smart agriculture.

4.1.3. Is conservation agriculture organic?

- Conservation agriculture and organic farming both maintain a balance between agriculture and resources, use crop rotation, and protect the soil's organic matter. However, the main difference between these two types of farming is that organic farmers use a plow or soil tillage, while farmers who practice conservation agriculture use natural principles and do not till the soil. Organic farmers apply tillage to remove weeds without using inorganic fertilizers.
- Conservation agriculture farmers, on the other hand, use a permanent soil cover and plant seeds through this layer. They may initially use inorganic fertilizers to manage weeds, especially in soils with low fertility. Over time, the use of agrichemicals may be reduced or slowly phased out.

4.2. Green Revolution – Krishonnati Yojana

Objective

To develop the agriculture and allied sector in a holistic and scientific manner to increase the income of farmers by enhancing production, productivity and better returns on produce.

Salient Features

It is a Centrally Sponsored Umbrella Scheme that has been implemented since 2016-17. It comprises of 11 schemes / missions:

- **Mission for Integrated Development of Horticulture (MIDH)-** to promote holistic growth of horticulture sector.
- **National Food Security Mission (NFSM) including National Mission on Oil Seeds and Oil Palm (NMOOP)-** to increase production of rice, wheat, pulses, coarse cereals, oilseeds and commercial crops through area expansion, restoring soil fertility and improving productivity.
- **National Mission for Sustainable Agriculture (NMSA)-** to promote sustainable agriculture practices focusing on integrated farming, appropriate soil health management and synergizing resource conservation technology.
- **Sub-Mission on Agriculture Extension (SMAE)-** to strengthen ongoing programmes of states/local bodies to achieve food security, empowering farmers, strengthen programme planning, ICT usage etc.
- **Sub-Mission on Seeds and Planting Material (SMSP)-** to increase production of certified / quality seed, increase seed replacement rate (SRR) and upgrade the quality of farm saved seeds.

Student Notes:

- **Sub-Mission on Agricultural Mechanization (SMAM)-** to increase the reach of farm mechanization, promote 'Custom Hiring Centres' to offset the adverse economies of scale arising due to small landholding and high cost.
- **Sub-Mission on Plant Protection and Plan Quarantine-** to minimize loss to quality and yield of agricultural crops, shield agricultural bio-security, facilitate exports and promote good agricultural practices.
- **Integrated Scheme on Agriculture Census, Economics and Statistics**- to undertake the agriculture census, study of the cost of cultivation of principal crops, to undertake research studies on agro-economic problems etc.
- **Integrated Scheme on Agricultural Cooperation (ISAC)-** to provide financial assistance for improving the economic conditions of cooperatives, remove regional imbalances.
- **Integrated Scheme on Agricultural Marketing (ISAM)-** to develop and provide agricultural marketing infrastructure, promote innovative and latest technologies and integrate markets through a common online market platform.
- **National e-Governance Plan (NeGP-A)-** to improve access of farmers to information &services, making available timely and relevant information to the farmers for increasing their agriculture productivity.

Note: Kindly refer to *Vision IAS PT 365 Government Schemes, 2020* document for details on the aforementioned specific schemes

4.3. Bringing Green Revolution to Eastern India (BGREI)

The program was launched in 2010-11 to address constraints limiting the productivity of "rice based cropping system" in eastern India comprising seven states – Assam, Bihar, Chhattisgarh, Jharkhand, Orissa, Eastern Uttar Pradesh (Purvanchal) and West Bengal.

Various initiatives under the scheme are –

- Block or cluster development of improved production technology.
- Asset building activities for farm improvement.
- Site specific activities for farm renovation.
- Seed production and distribution.
- Marketing support and post-harvest management.

Objectives

- To increase production and productivity of rice and wheat by adopting latest crop production technologies.
- To promote cultivation in rice fallow area to increase cropping intensity & income of the farmers.
- To create water harvesting structures and efficient utilization of water potential.
- To promote post-harvest technology and marketing support.

4.4. Operation Greens

Operation Greens was announced in the Budget speech of 2018-19 with an outlay of Rs 500 crores to stabilize the supply of Tomato, Onion and Potato (TOP) crops and to ensure availability of TOP crops throughout the country round the year without price volatility.

Major objectives of "Operation Greens"

- Enhancing value realisation of TOP farmers by targeted interventions to **strengthen TOP production clusters** and their Farmer

Horticulture in India- Related facts

- Over the last decade, the area under horticulture grew by 2.6% per annum and annual production increased by 4.8%.
- India witnessed the shift in area from food grain towards horticulture crops over last five years (from 2012-13 to 2017-18).
- India is second largest producer of Vegetables and Fruits.
- The total horticulture production was highest in case of Uttar Pradesh (392.48 Lakh Tonnes) followed by West Bengal (324.2 Lakh Tonnes).

Student Notes:

Producers Organizations (FPOs), and linking/connecting them with the market.

- **Price stabilisation** for producers and consumers by proper production planning in the TOP clusters and introduction of dual use varieties.
- **Reduction in post-harvest losses** by creation of farm gate infrastructure, development of suitable agro- logistics, creation of appropriate storage capacity linking consumption centres to increase shell life.
- **Increase in food processing capacities** and value addition in TOP value chain with firm linkages with production clusters.
- **Setting up of a market intelligence network** to collect and collate real time data on demand and supply and price of TOP crops.

4.5. Zero Budget Natural Farming (ZBNF)

It is a natural farming technique, developed by **Subhash Palekar**, in which farming is done without use of chemicals and without using any credits or spending any money on purchased inputs.

ZBNF reduces the cost of production down to zero due to utilisation of all the natural resources available in and around the crops. Farmers use earthworms, cow dung, urine, plants, human excreta and other biological fertilizers for crop protection.

Features of ZBNF

- **Inter-cropping**: Under this, combination of various crops is grown simultaneously to produce greater yield on given piece of land by making use of resources that may be utilised by single crop. E.g. farmer grow combination crops such as pearl millet, red gram, foxtail millet, along with chillies and tomatoes or multiple crops with groundnut as main crop.
- **Use of Bio-Fertilizers and elimination of chemical fertilizers and pesticides** – Farmers have a practice named Jiwamrita in which they apply fertilizers made of local cow dung and cow urine.
- **Utilization of soil moisture**: Farmer of drought-prone areas adopt mulching and Waaphasa to reduce the loss of natural moisture of the soil, increase soil aeration, enhance soil health and fertility and ensure favourable microclimate in the soil.
- **Reduce input cost of agriculture**: ZBNF through reduced expenditure on expensive inputs such as fertilizers and pesticides cuts down on input cost and increases farmer income.
- **Contours and bunds**: to preserve rain water as it promotes maximum efficacy for different crops.
- ZBNF also includes **replenishing water bodies** such as farm ponds to ensure water availability during dry spells.
- Farmers also practice replenishing local species of earthworms on the farm to increase the organic matter in the soil which in-turn increases soil's capacity to retain moisture.

Way ahead

In June 2018, Andhra Pradesh rolled out an ambitious plan to become India's first State to practise 100% natural farming by 2024. It aims to phase out chemical farming over 80 lakh hectares of land, converting the State's 60 lakh farmers to ZBNF methods. Himachal Pradesh,

Chhattisgarh, Kerala, Karnataka and Uttarakhand have also invited Mr. Palekar to train their farmers.

NITI Aayog has been among the foremost promoters of Mr. Palekar and the ZBNF method. However, its **experts have also warned that multi-location studies are needed to scientifically validate the long-term impact and viability of the model before it can be scaled up and promoted country-wide.**

The Indian Council of Agricultural Research is studying the ZBNF methods practised by basmati and wheat farmers in Modipuram (Uttar Pradesh), Ludhiana (Punjab), Pantnagar (Uttarakhand) and Kurukshetra (Haryana), evaluating the impact on productivity, economics and soil health including soil organic carbon and soil fertility. If found to be successful, an enabling institutional mechanism could be set up to promote the technology

Student Notes:

5. Previous Years UPSC Mains Questions

1. What are the major reasons for declining rice and wheat yield in the cropping system? How crop diversification is helpful to stabilize the yield of the crop in the system?
2. How has the emphasis on certain crops brought about changes in cropping patterns in recent past? Elaborate the emphasis on millets production and consumption.
3. How do subsidies affect the cropping pattern, crop diversity and economy of farmers? What is the significance of crop insurance, minimum support price and food processing for small and marginal farmers?

6. Previous Years Vision IAS GS Mains Questions

1. ***India has seen significant progress towards increasing production, yield levels and crop diversification in last three decades. Still, the agricultural productivity in India is among the lowest in the world. In this context, analyse the reasons for low productivity and suggest some measures to improve the same.***

Approach:

- Identify causes of low productivity in India in spite of the factors mentioned
- Suggest improvement measures

Answer:

Causes of low productivity

- **Overcrowding in agriculture:** Disguised unemployment and low marginal productivity because too many people are directly dependent on farming. Increased population led to sub-division and fragmentation of holdings thus there was a decline in the area of land available for cultivation per capita.
- **Discouraging rural atmosphere:** Very few farmers are quick in following modern technology exposed to them; but vast majority of farmers are not motivated to learn and try new ways. However, this has steadily changed in recent years.
- **Inadequate Farm Credits:** Farm Credits have been inadequate despite the efforts of the government and RBI to increase it.
- **Small Size of Holdings:** The average size of holdings in India is very low and they are fragmented and small. Since they are small, scientific cultivation techniques cannot be adopted. Small sized holdings lead to great waste of time, labour and cattle power, difficulty in proper utilization of irrigation facilities and consequent litigation among farmers etc.
- **Inadequate irrigation facilities:** Indian agriculture is mostly dependent on rainfall and very few farmers avail the facility of artificial irrigation. Though over the time, more area was brought under irrigation, still there is a great scope for improving the irrigation facilities

Student Notes:

Improvement measures

- There should be necessary programmes which demonstrate the technology and show the importance of crop rotation, multi-cropping etc. to the farmers.
- An Agricultural Mechanization Corporation can be established which can help an average farmer who cannot manage with hired labour.
- Greatest importance should be given to the promotion of transport, marketing facilities and consolidation of holdings.
- Improvement in storage facilities, providing tenant security, implementing the recommended projects in rural areas for improving the irrigation facilities for supplementing better quality seeds and for increasing awareness among the people about hybrids, varieties, disease resistant varieties, drought resistant varieties, etc. are the other major aspects to be concentrated upon.
- There is little scope for increasing the area of cultivation in future but through multiple cropping, relying on irrigation facilities, high yielding varieties, etc. we can raise the agricultural productivity.

2. Food grain constitutes 64 percent of the gross cropped area (GCA), although it accounts for less than 25 percent of the total value of output of agriculture and allied activities. Give reasons for this existing imbalance in the current cropping pattern of food grains in India and steps needed to correct such an imbalance.

Approach:

- Highlight factors incentivising food grain production
- Also focus on factors creating disincentive for non-food grain products like horticultural products etc.
- Mention some steps taken by government to correct such imbalance
- Suggest some more steps required

Answer:

In India, there is an existing imbalance in the cropping pattern of the food grains. The food grains occupied an area of 97.32 million hectare (mha) in 1950-51 has increased to 126.74 mha in 2011-12. In these years, the area under cereals such as rice and wheat has grown but the same under coarse cereals and millets has decreased.

Reasons of imbalance in Crop Pattern:

- Prices of food grains have been rising quite fast and the farmers have started growing food crops in the similar way they grow commercial crops like cotton, oil seed crops sugarcane etc.
- Cultivation of food grains has become highly remunerative and productive under the influence of new technology.
- Traditionally, the **Minimum Support Prices** for wheat and rice have been maintained reasonably high (in comparison to millets such as Jowar and Bajra). This has helped the farmers to increase their production.
- There has been a change in the consumption pattern and people have moved from coarse cereals to wheat and rice for their main dietary grain. This is because of the increase in the income of the people and coarse cereals being the inferior goods.
- The strategic objectives of agricultural development in India have been changing over time.
    - In 1960s, it was to maintain the prices of food grains at low level. The government significantly supported the growth of wheat and rice cultivation via its policy intervention, procurement and technology.

Student Notes:

- In 1960s to 1980s, it was to maximize food production.
- In 1980s to 1990s, it was to go for a demand driven production pattern.
- Since 1990s, it was to reduce inputs of agricultural commodities.

- Lack of market and storage facilities for horticultural products
- Absence of stable price regime for horticultural products

Various steps taken by government

- Government through National food security mission focussed on increasing production of pulses, which India has been importing
- Oil seed production has also been emphasized under National mission on oilseed and oil palm
- National horticultural mission for promoting horticultural products.

Some other steps like rationalisation of MSP for products other than cereals is necessary**.**

3. "Multiplicity of cropping systems has been one of main features of Indian agriculture and it is attributed to rainfed agriculture and prevailing socio-economic situations of farming community." Comment.

Approach*:*

The answer should highlight the reason for origin and development of various cropping patterns in India. Besides, a brief mention of the various factors which guide these patterns should be made. Answer should be supported by examples of some of these patterns.

Answer*:*

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

- Rainfed agriculture still accounts for over 92.8 million hectare or 65 per cent of cropped area. A large diversity of cropping systems exists under rainfed and dryland areas with an overriding practice of intercropping, due to greater risks involved in cultivating larger area under a particular crop.
- 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, who constitute 56.15 million marginal (<1.0 hectare), 17.92 million small (1.0-2.0 hectare) and 13.25 million semi-medium (2.0-4.0 hectare) farm holdings, making together 90 per cent of 97.15 million operational holdings. An important consequence of this has been that crop production in India remained to be considered, by and large, a subsistence rather than 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 years interchangeably on different farm fields.

Depending upon the natural water resources, each region has certain area under irrigated agriculture. But, broadly considering, two distinct irrigated ecosystems emerge. One is Indo-Gangetic Plain region comprising the states of Punjab, Haryana, plains of Uttar Pradesh, Bihar and plains of Jammu & Kashmir. The other ecosystem may be carved out of coastal areas of Andhra Pradesh and Tamil Nadu.

Under influence of all above factors, cropping systems remain dynamic in time and space, making it difficult to precisely determine their spread using conventional methods, over a large territory. Based on rationale of spread of crops in each district in the country, 30 important cropping systems have been identified. Some of them are rice-wheat, rice-rice, rice-gram, rice-mustard, rice- groundnut, rice-sorghum, pearl millet-gram, pearl millet-mustard, pearl millet-sorghum, and cotton-wheat.

4. Despite favourable demand and supply factors as well as high rate of return, diversification towards horticulture crops has been slow. Examine. What steps are required to achieve the potential of this sector?

Approach:

- In introduction delineate the meaning and significance of horticulture insofar as higher rate of returns is concerned.
- Delineate the favourable demand and supply factors for this sector.
- Explain why diversification towards this sector has been slow.
- Suggest measures to achieve the potential of this sector.

Answer:

Horticulture is the branch of agriculture that deals with art and science of fruits, vegetables, flowers and ornamental plants. It offers high rate of returns as:

- Fruits and vegetables give 4-10 times the return from other crop groups namely cereals, pulses and oilseeds.
- A one per cent shift in area from non-horticultural crops to horticultural crops adds 0.46 percentage points to growth rate of agriculture sector.

The higher rate of returns from horticulture is also backed by favourable demand and supply factors. For example -

- **Changes in taste and preferences** - Due to changes in taste, preferences and food habits, the consumption pattern in India has been shifting towards fruits and vegetables.
- **Increasing incomes** - 1 per cent increase in per capita expenditure results in 1.9% and 1.02% increase in demand for fruits and vegetables respectively. Thus, per capita intake of fruits and vegetables in the country will keep rising in coming years.
- **Increasing imports** - There is large deficiency of these items in Indian diet. India's import of fruits is rising by 20 per cent per year. All these indicators suggest that demand side prospects for fruits and vegetables are very bright.
- **Technological developments** in horticultural crops have facilitated some diversification. Varieties of horticultural crops have been developed for cultivation in off season, under diverse climatic conditions and with various attributes to attract consumers.

Despite these factors the area under horticulture crops in the country has remained below 10 per cent. The major constraints for the growth in horticultural crops are:

- **System of Marketing -** Horticultural crops, particularly vegetables, are more popular with smaller size land holdings as they have advantage in terms of family labour required for labour intensive production. However, such farmers are severally constrained by scale factor in marketing of produce.
- **Inadequate processing facilities** - In most cases a horticultural crop does not come to maturity at the same time and harvestable produce is distributed over a span of a few weeks. Being perishable, these crops cannot be stored at home to make a

economical lot for taking to market. And if not sold, it results in big post harvest loss

- **Other constraints** include very high growth in horticultural imports, large price spread between producers and end users, frequent and often violent price fluctuations, low level of processing, and very low post harvest value addition.

Various steps that are required in order to achieve the potential of this sector are as follows:

- **Institutionalize cooperatives** – It will help small growers to trade their produce in the market as combined harvest will be sufficient to trade in markets.
- **Provide favorable market conditions** - It is needed to give complete freedom to producers and buyers for sale/purchase throughout the country and take horticulture produce out of the purview of APMC act so that they do not need to sell compulsorily in the local mandis and can sell even its small produce directly in the market or can pool with other producers for marketing.
- **Development of modern value chain** - This has not been happening due to legal hurdles and restrictions on free and direct marketing. If the sector is deregulated then many innovative vegetable and fruit sellers in urban areas will be attracted to develop back-end linkage to get direct supply from the producers.
- **Free marketing –** It will also attract large investments from private sector as happened in the case of milk production

These require action both by the states and the Central government. The onus for freeing market for horticultural produce rests with the states while support of Central government is crucial for promoting producers' organizations and fruits and vegetable processing.

5. What do you understand by cropping pattern? What are the factors that influence the cropping pattern in India? Is there a need to change the cropping pattern in the country keeping the agro-ecological concerns in mind?

Approach:

- Define cropping pattern.
- Enumerate factors of cropping pattern.
- Discuss the problems with present cropping pattern.

Answer:

Cropping pattern is the proportion of area under different crops at a point of time. A change in cropping pattern implies change in proportion of area under different crops.

The factors affecting cropping pattern in India are:

- **Physical factors**: Cropping pattern of any region depends upon geographical features as soil, climate, rainfall, etc. Apart from this, it depends on the nature and availability of irrigation facilities. Example Cotton in deccan plateau because of black soil.
- **Economic Factors**:
  - **Price and Income maximization:** Price influences the acreage. Inter crop price parity leads to shift in acreage between the crops. Fixed procurement price of wheat and rice has helped in increasing its acreage.
  - **Farm Size:** There is a direct relationship between farm size and cropping pattern. Farmers with small size farm prefer subsistence agriculture. They go for cash crops only after meeting their food requirement.

Student Notes:

- **Insurance against the risk:** The need to minimize risk leads to crop diversification.
- **Availability of Inputs:** Crop pattern is dependent on inputs like seeds, fertilizer, water, etc. The availability of seeds of groundnut induced farmers in Madhya Pradesh to increase its acreage.
- **Tenure**: Under the crop sharing system, the landlord has dominant voice in the choice of the cropping pattern and this helps in the adoption of income maximizing crop adjustments.

Problems with current cropping pattern:

- In India, there is an existing imbalance in the cropping pattern of the food grains because a large proportion of the area under food grains is occupied by rice and wheat.
- Further, there is a gradual shift from non-food grains to food grains. Reasons of imbalance in Crop Pattern Prices of food grains have been rising quite fast and the farmers have started growing food crops in the similar way they grow commercial crops like cotton, oil seed crops sugarcane etc. Cultivation of food grains has become highly remunerative and productive under the influence of new technology and reasonably high Minimum Support Prices for wheat and rice.
- There has been a change in the consumption pattern and people have moved from coarse cereals to wheat and rice for their main dietary grain. This is because of the increase in the income of the people and coarse cereals being the inferior goods.
- Constant increase in the production of rice and wheat with little emphasis on other cereals. This is the result of government's procurement at MSP, example being Punjab
- Cultivation of water intensive crops despite low ground water levels.
- Use of excess quantities of fertilizers without considering the existing soil quality
- Indiscriminate use of pesticides and insecticides resulting in water pollution and reduction in soil fertility
- Use of HYV which require high cost inputs

All the above cropping patterns are inefficient not sustainable and there is need to move away from the present rice wheat dominant cropping pattern.

6. Not only does the yield (measured in tonnes/ha.) of a crop but a number of other factors determine the choice of crops that a farmer cultivates. Elaborate with special focus on cropping pattern in India.

Approach:

- Briefly define the concept of cropping pattern.
- Discuss various factors which influence the cropping pattern- such as geo-climatic, socio-cultural, economic, historical and political factors.
- Also briefly highlight some discrepancies in the existing cropping pattern along with concrete suggestions.

Answer:

Cropping pattern is yearly sequence and spatial arrangement of crops or of crops and fallow on a given area it means the proportion of area under various crops at a point of time. Cropping pattern is, however, a dynamic concept as it changes over space and time.

Student Notes:

Some of the dominant factors which influence cropping pattern are-

1. **Physical factors**
   a. Physiographic, climate and water imposes limits on growth and distribution of plants and animals.
   b. Depending on terrain, topography, slope, temperature, amount and reliability of rainfall, soils and availability of water for irrigation, the cropping patterns vary.
   c. For example, in rainfall deficient areas of Rajasthan, farmers grow bajra, while in Brahmaputra valley of Assam rice is the dominant crop.
2. **Soil type**
   a. For example cotton is grown in regur (black earth) soil of Maharashtra and Gujarat, while the loamy soils of western Uttar Pradesh, Haryana and Punjab are ideally suited for wheat, rice and sugarcane.
3. **Irrigation facilities**
   a. Where ever water is available, not only can a different crop be grown but even double or triple cropping will be possible. When new irrigation facilities are provided, the whole method of cultivation may change.
4. **Availability of Inputs**
   a. Seeds, fertilizers, water storage, marketing, transport etc. also affect the cropping pattern.
5. **Government Policies**
   a. The legislative and administrative policies of the government may also affect the cropping pattern. Food Crops Acts, Land Use Acts, intensive schemes for paddy, for cotton and oilseeds, subsidies affect the cropping pattern.
6. **Economic and behavioral motivation**
   a. MSPs for some crops such as wheat and rice have remained high in comparison to millets. As a result, intercrop price disparities lead to shifts in acreage between the crops.
7. **Institutional factors**
   a. Such as land tenancy, ownership of land, size of holdings and size of fields also impose restrictions on the cropping patterns of a region.
      i. In areas of small holdings, farmers tend to be subsistent despite innovation diffusion.
      ii. Contrary to this, farmers with large holdings have more risk bearing capacity and they have relatively high degree of commercialization.
8. **Yield (tonnes/ha.) of a crop**
   a. Higher the yield per unit area, higher will be returns on investment of time and money. This is a strong factor in determining cropping pattern of paddy.

In India, there is an existing imbalance in cropping pattern of food grains because a large proportion of area under food grains is occupied by cereals. Green Revolution which focused on cereals alone, combined with the MSP regime in favor of cereals has skewed cropping pattern, although, a shift is being witnessed towards other commercial crops and horticulture. Also, there is a strong need to shift towards Integrated Farming Systems combining several enterprises like cropping system, dairying, piggery, poultry, fishery, apiculture, etc. in a harmonious way. It would also give a strong boost in achieving the much cherished vision of doubling the farmer's income in next 5 years.

Student Notes:

7. The cropping pattern in India is highly skewed towards crops that are water-intensive. In this context, discuss the need to shift the focus from land productivity to irrigation water productivity.

Approach:

- Briefly mention the issues related to cropping pattern in India.
- Highlight the reasons for the highly skewed crop pattern towards water intensive crops.
- Discuss the need to shift the focus from land productivity to irrigation water productivity.
- Conclude accordingly.

Answer:

India's cropping pattern highlights the rampant cultivation of water intensive crops such as sugarcane production in Maharashtra, paddy in North-West India, which are amongst the water stressed regions of India.

Various reasons behind this trend:

- **Government's incentive structure:** The government's policies for various inputs including subsidies on water, power and fertilizer has promoted farmers to cultivate crops, which are highly water intensive such as paddy and sugarcane. Rice and sugarcane crops together consume more than 60% of water available for irrigation.
- **Minimum Support Prices (MSPs):** Though MSPs are currently announced for 23 crops, the most effective price support is for sugarcane, wheat and rice.
- **Demand for water intensive crops:** Rice is one of the most important staple food crop in India. Similarly, there is large industrial demand for crops like cotton, which push the farmers to grow them as they bring larger profits.
- **Increased water demand by crops:** The new artificially modified HYV seeds have been giving higher crop yields, but they require more water than natural seeds.
- **Lack of sensitization**: There is a lack of awareness among farmers about the strain on natural resources due to water-intensive crops. Mostly, the same cropping pattern keeps continuing over the next generation of farmers.

In this context, **Economic Survey 2018-19** suggests a transition from land productivity to irrigation water productivity, which emphasizes on more crops per drop, improving total nutrition per drop and total food crops per drop. The **need for such a shift is due to the following factors:**

- **Water crisis:** Growing water intensive crops has led to severe water scarcity across various regions like Vidarbha. As per the Niti Aayog, around 600 million Indians are facing high-to-extreme water stress and the situation is set to worsen as water requirements increase.
- **Skewed balance of input and output:** India's agricultural sector accounts for 89 percent of groundwater extraction for irrigation purposes, but contributes only 15 percent to the country's GDP.
- **Nutrition and food security:** To increase irrigation water productivity, there is need to focus on cultivation of less water intensive crops like millets, bajra etc. India could reduce the amount of water it uses for irrigation by a third and simultaneously address its persistent malnutrition problem, if it replaces its rice crop with more nutritious and less thirsty cereals
- **Climate change:** Climate change has increased the frequency of drought in the country. In the coming times, India is going to face water scarcity hence there is a need to focus on improving water productivity.

Student Notes:

- **Soil productivity:** After decades of success of the Green Revolution, states like Punjab and Haryana are facing the challenge of soil salinity which has lowered the productivity of soil in the states. Degrading soil productivity is also affecting the sustainability of farming.

In order to bring this shift, governments need to focus on crop diversification, sustainable practices like Zero Budget Natural Farming (ZBNF), nudging farmers to use micro-irrigation techniques such as drip irrigation and micro-sprinklers. The focus should be on growing crops, which are climatically suitable for any region. In Eastern India, water intensive crops can be grown while in semi- arid regions of India like Central India, Rajasthan etc the focus should be on cultivation of less water intensive crops like millets and bajra etc.

8. Provide arguments both in favour of and against adoption of Genetically Modified (GM) crops on a large scale in India.

Approach:

- Explain what you understand by genetic modification and give examples of GM crops.
- Enlist arguments in favour and against adoption of GM crops on a large scale in India.
- Conclude the answer accordingly.

Answer:

Genetic modification is a process of altering the genes of an organism either by altering an existing section of DNA, or inserting a gene from another organism. India has the **world's fifth largest cultivated area** under genetically modified (GM) crops, at **11.4 million hectares** in 2017.

Bt cotton is the only GM crop allowed to be cultivated in India. The other GM crops under regulatory consideration apart from Bt cotton include glyphosate-tolerant cotton and biotech hybrid mustard. However, the proposition of introducing other GM crops such as **GM Mustard, Bt brinjal** etc. face stiff opposition owing to various concerns of **seed sovereignty**, and **ecological health** of natural resources.

Arguments in favour of GM crops:

- **Food security**: GM crops have high productivity and are thereby vital for ensuring food security to the rising population. It will also reduce dependence on imports e.g. import of cooking oil.
- **Lower costs of production:**
  - **Lesser consumption of pesticides and insecticides**: GM food crops have stronger resistance to diseases. For instance, **the success of the Bt cotton technology** also ensured resistance to **the bollworm**, which led to improved agronomic practices and use of novel pesticide molecules for control of other pests.
  - GM crops are estimated to have increased agriculture production by nearly $100 billion and prevented nearly 500 million kg of pesticides from being sprayed since the technology was first commercialized nearly two decades ago.
  - Less labour needed in procedures like weeding etc.
- **Higher yield and shorter duration**: GM crops have shorter growing cycles, and produce higher yields, thus yielding higher incomes.
- **Safety**: According to various studies by independent agencies, GM foods have passed safety assessments and are unlikely to pose risks to human health.

Student Notes:

- **Growth in industry and exports**: Increased production of crops could provide further benefits to industries such as food processing industry. This will also provide opportunities for increased export.

Arguments against GM crops:

- **Public health and safety**: It is argued that GM crops may have carcinogenic effects. According to the WHO, GM crops may provoke allergic reaction and gene transfer. Gene transfer from GM foods to cells of the body in the gastrointestinal tract may adversely affect human health.
- **Threats to bio-diversity**: It is believed that if GM foods are mixed with non-GM crops, there may be threats to **ecological balance and bio-diversity,** which can have an indirect effect on food safety and food security.
- **Field trials and testing:** Field trials of GM crops are not adequately and appropriately supervised. In a paper by M.S. Swaminathan, it was reported that **the precautionary principle (PP)** has been done away with and no science-based and **rigorous biosafety protocols and evaluation of GM crops are in place**.
- **Lack of regulation and illegal imports:** Lack of regulation leads to illegal varieties of GM crops being imported. For instance, many environmentalists argue that illegal Bt cotton, HT cotton cultivation and other illegal imports of GM foods, are taking place.
- **Livelihood security:** Critics argue that GM crops have failed to protect small and marginal farmers.

A balanced approach to GM foods is therefore required toward achieving targets of **food security and improving the condition of farmers.** This can be done by ensuring effective measures for **regulation of GM crops and natural resource management where environmental safety is addressed.**

Student Notes:

DIFFERENT TYPES OF IRRIGATION AND IRRIGATION SYSTEM

Contents

Student Notes:

1. Introduction

Water needs to be applied to crops in the exact amount and on time. In this context, irrigation becomes important in order to reduce risks associated with agriculture.

Irrigation is the artificial supply of water to crops for the purpose of agricultural production. There can be various artificial means for supplying water such as canals, wells, tube-wells, tanks etc. which transport water from different sources such as rivers, ponds or underground water.

2. Need for Irrigation

Agriculture plays a vital role in India's economy. 54.6 per cent of the population is engaged in agriculture and allied activities (census 2011) and it contributes 17 per cent to the country's Gross Value Added (current price 2015-16, 2011-12 series).

- In the next 35 to 45 years, world food production will need to double to meet the demands of increased population.
- Agriculture requires adequate amount of water throughout the lifecycle of a crop. If the rainfall decreases to less than 30 cm, agriculture becomes impossible without irrigation.
- India's rainfall pattern suffers from both - spatial and temporal variations - as well is known for its uncertainty, irregularity, unreliability and erratic nature.
- India, with her 1.2 billion population, has to have to ensure food security for her citizens through increased agricultural productivity and production and cannot remain dependent on others.
- Irrigation increases crop yield, protects from famine and also helps in cultivating superior crops with the water supply as per need of the crops.
- Irrigation maintains moisture in the soil. Moisture is necessary for the germination of seeds.
- Crops like rice, jute, sugarcane, etc. need more water, which can be fulfilled only through irrigation.
- New and high-yielding seeds need additional water through irrigation for higher productivity.
- Agricultural activities provide employment to more than 50 % of the total workforce in India so we need to reduce the risk associated with agriculture and increase its productivity to provide better returns to farmers.

3. Different Types of Irrigation System

- In India, the irrigated area consists of about 36 per cent of the net sown area.
- There are various types of systems of irrigation practices in different parts of India which differ in how the water obtained from the source is distributed within the field.
- In general, the goal is to supply the entire field uniformly with water, so that each plant has the amount of water it needs, neither too much nor too little.

Irrigation by Source in India

Source	Area (000 Hectares)
Canals	16278
Tanks	1842
Tube-wells	31126
Other Wells	11312
Other Sources	7542

Source- Statistical Year Book of India, 2017, MOSPI

3.1. Irrigation System Based on Source

Depending on the way irrigation water is conveyed to the head or upstream point of a field, irrigation system can be categorized as following:

3.1.1. Tank Irrigation

A tank is a water storage system developed by constructing a small bund of earth or stones built across a stream. The water impounded by the bund is used for irrigation.

Student Notes:

The ratio of tank irrigated land to the total irrigated area of the country has reduced from 14 per cent in the 1960-61 to about 4.6 per cent in 2000-01, primarily due to increase in well and tube well irrigation and partly due to fall in the tank irrigation.

Areas where Tank Irrigation is Prevalent

- In peninsular area, tank irrigation is prevalent in Andhra Pradesh, Telangana, Tamil Nadu, Karnataka plateau, eastern Madya Pradesh, eastern Maharashtra, interirio Orissa and Kerala.
- Outside the Peninsular plateau, West Bengal, Bihar, Bundelkhand area of Uttar Pradesh, Rajasthan and Gujarat have tank irrigation.

Figure: Tank Irrigation

Tank irrigation is popular in the peninsular plateau area mainly because of following reasons:

- The undulating relief and hard rock's make it difficult to dig canals and wells.
- There is little percolation of rain water due to hard rock structure and ground water is not available in large quantity.
- Most of the rivers of this region are seasonal and dry up in summer season. Therefore, they cannot supply water to canals throughout the year.
- There are several streams which become torrential during rainy season. The only way to make best use of this water is to impound it by constructing bunds and building tanks. Otherwise this water would go waste to the sea.
- The scattered nature of population and agricultural fields also favours tank irrigation.

Merits of Tank Irrigation

- Most of the tanks are natural and do not involve heavy cost for their construction.
- Tanks are generally constructed on rocky bed and have longer life span.
- In many tanks, fishing is also carried on, thus, supplementing both the food resources and income of the farmer.

Demerits of Tank Irrigation

- Many tanks dry up during the dry season and fail to provide irrigation when it is needed the most.
- Silting of the tank bed is a serious problem and it requires desilting of the tank at regular intervals.
- Much water is evaporated from the large expanse of shallow water and is thus not available for irrigation.
- Lifting of water from tanks and carrying it to the fields is a strenuous and costly exercise which discourages the use of tanks as a source of irrigation.

3.1.2. Wells and Tube Wells

Wells

A well is a hole dug in the ground to obtain the ground water. An ordinary well is about 3-5 metres deep but deeper wells may go up-to 15 metres. This method is being used since time immemorial to lift the ground water for irrigation, drinking, bathing and for other purposes.

Areas of Well Irrigation

- Well irrigation is more popular in those regions where ground water is in plenty and where there are few canals.
- These areas include a large part of the Great Northern Plain, the deltaic regions of the Mahanadi, the Godavari, the Krishna and the Cauvery, parts of the Narmada and the Tapi

valleys and the weathered layers of the Deccan Trap and crystalline rocks and the sedimentary zones of the Peninsula.

- However, the greater part of the Penisnular India is not suitable for well irrigation due to rocky structure, uneven surface and lack of underground water.
- Large dry tracts of Rajasthan, the adjoining parts of Punjab, Haryana, and Gujarat and some parts of Uttar Pradesh have brackish ground water which is not fit for irrigation and human consumption and hence unsuitable for well irrigation.

Tube Wells

A tube well is a **deeper well** (generally over 15 metres deep) from which water is lifted with the help of a **pumping set** operated by an electric motor, a diesel engine or solar power.

In several areas, the 'persian wheel' earlier used for lifting water has been replaced by tube wells.

Figure: Tube Well Irrigation

A tube well cannot be constructed everywhere and requires some **geographical conditions** favouring its installation, such as:

- There should be sufficient quantity of ground water because a tube well can generally irrigate 2 hectares per day against 0.2 hectares per day irrigated by an ordinary well.
- The water level should be nearly 15 metres. If the water table is more than 50 metres deep the cost of pumping out water from the tube well becomes uneconomic.
- There should be regular supply of cheap electricity or diesel so that water from the tube well can be taken out at the hour of need.
- The soil in the immediate neighbourhood of the tube-well should be fertile so that there is demand for irrigation and the cost involved in the construction and operation of the tube well can be recovered by the increased farm production.

Major Areas under Tube Wells

More than three fourths of India's tube wells are functioning in Tamil Nadu, Maharashtra, Andhra Pradesh, Telangana, Uttar Pradesh, Madhya Pradesh, Karnataka and Punjab.

Merits of Well and Tube Well Irrigation

- Well is simplest and cheapest source of irrigation and the poor Indian farmer can easily afford it.
- Well is an independent source of irrigation and can be used as and when the necessity arises. Canal irrigation, on the other hand, is controlled by other agencies and cannot be used at will.
- Excessive irrigation by canal leads to the problem of reh which is not the case with well irrigation.
- There is a limit to the extent of canal irrigation beyond the tail end of the canal while a well can be dug at any convenient place.
- Several chemicals such as nitrate, chloride, sulphate, etc. are generally found mixed in well water. They add to the fertility of soil when they reach the agricultural field along with well water.
- The farmer has to pay regularly for canal irrigation which is not the case with well irrigation.
- More reliable during periods of drought when surface water dries up.

Student Notes:

Demerits of Well and Tube Well Irrigation

- Only limited area can be irrigated. Normally, a well can irrigate 1 to 8 hectares of land.
- The well may dry up and may be rendered useless for irrigation if excessive water is taken out of it.
- In the event of a drought, the ground water level falls and enough water is not available in the well when it is needed the most.
- Tubewells can draw a lot of groundwater from its neighbouring areas and make the ground dry and unfit for agriculture.
- Well and tube well irrigation is not possible in areas of brackish groundwater.
- Lack of electricity, diesel and requirement of capital investment for Tubewell

3.1.3. Canal Irrigation

- Canals used to be the most used source of irrigation up-to 1960s, but in the 1970s they wells and tube wells became most used source of irrigation and now, canals constitute the second most important source of irrigation in India.
- Canals are an effective source of irrigation in areas of low level relief, deep fertile soils, perennial source of water and extensive command area.
- Therefore, the **main concentration** of canal irrigation is in the northern plain of India, especially the areas comprising Uttar Pradesh Haryana and Punjab.
- The digging of canals in rocky and uneven areas is difficult and uneconomic. Thus the canals are practically absent from the Peninsular plateau area.
- However, the coastal and the delta regions in South India do have some canals for irrigation.

Figure: Canal Irrigation

Canals in India are of two types:

- **Inundation canals**, which are taken out from the rivers without any regulating system like weirs etc. at their head. Such canals provide irrigation mainly in the rainy season when the river is in flood and there is excess water. When the rainy season is over, the flood in the river subsides, the level of water falls below the level of the canal head and the canal dries up. Some canals taken off from the Satluj in Punjab were of this type. Since irrigation from this type of canals is uncertain, they have been converted in perennial canals.
- **Perennial Canals** are those which are taken off from perennial rivers by constructing a barrage across the river. Most of the canals in India today are perennial.

Barrage: An artificial obstruction placed in a river or water course to increase the depth of water.

Areas where Canal Irrigation is Prevalent

- The main canal irrigated areas are in the northern plains of India where Uttar Pradesh, Punjab, Haryana, Rajasthan and Bihar account for about 60 per cent of the canal irrigated area of the country.
- In south and central India, Andhra Pradesh, Maharasthra, Karnataka, Madhya Pradesh, Chhattisgarh, Orissa and Tamil Nadu are important states of canal irrigation.

Merits of Canal Irrigation

- Most of the canals provide perennial irrigation and supply water as and when needed. This saves the crops from drought conditions and helps in increasing the farm production.
- Canals carry a lot of sediment brought down by the rivers. This sediment is deposited in the agricultural fields which add to the fertility of soil.

- Some of the canals are parts of multipurpose projects and, therefore, provide cheap source of irrigation.
- Although the initial cost involved in canal irrigation is much higher, it is quite cheap in the long run.

Demerits of Canal Irrigation

- The canal water soaks into the ground and leads to the problem of waterlogging along the canal route.
- Excessive flow of water in the fields raises the ground water level. Capillary action brings alkaline salts to the surface and makes large areas unfit for agriculture. Vast areas in Panjab, Haryana, Uttar Pradesh and Maharashtra suffer from the problem of 'reh' caused by canal irrigation.
- The marshy areas near the canals act as breeding grounds of mosquitoes which result in widespread malaria.
- Many canals overflow during rainy season and flood the surrounding areas.
- Canal irrigation is suitable in plain areas only.

3.2. Different Types of Irrigation Systems Based on Delivery Technique

Irrigation water conveyed to the head or upstream point of a field must be applied efficiently on the whole area such that the crops growing in the either fields gets water more or less uniformly. There are various types of irrigation techniques that differ in how the water is distributed within the field. These are:

3.2.1. Surface Irrigation

One of the most common and oldest methods of irrigation is surface irrigation. This method uses the force of gravity to distribute the water, which then seeps into the soil. It's also known as flood irrigation because it simply allows water to flow into an area. Surface irrigation can be divided into furrow, border strip or basin irrigation. This method is not as efficient as other options because there is a tendency to use too much water in order to saturate the land.

The advantages of surface irrigation include:

- Requires less manual labor than hose spraying or shifting hose sprinklers.
- Better able to cover a large plot of land in a shorter amount of time.
- Not as negatively influenced by winds or sediments as other systems.

Drawbacks to surface irrigation include:

- Potential overwatering and wasteful runoff due to frequent erosions
- If soil lacks proper sloping or doesn't absorb readily, water can't move through the field
- Standing water can harm crops, mainly by reducing the respiration of the roots
- Loss of water occurs due to percolation

3.2.2. Sprinkler Irrigation

Sprinkler irrigation is a method of applying water to the land in a manner that mimics natural rainfall. Water is distributed through a system of pipes, usually by pumping, and is then sprayed into the air through sprinklers that break up the water into small drops that uniformly fall to the ground.

The advantages of sprinkler irrigation include:

- Suitable for varying sizes of land—both large and small plots.

Micro-Irrigation

Micro-irrigation can be defined as the application of water at low volume and frequent interval under low pressure to plant root zone.

Types of Micro-irrigation:

- Sprinkler Irrigation
- Drip Irrigation
- Subsurface Irrigation
- Central-Pivot Irrigation

Student Notes:

- Better able to direct water flow to specific areas of a property, avoiding water loss.
- Ability to administer fertilizers and chemical treatments through the system for even application.

Disadvantages:

- The initial cost is rather very high.
- Any cost of power to provide pressure must be added to the irrigation charges.
- Wind interferes with the distribution pattern, reducing spread or increasing application rate near lateral pipe.
- There is often trouble from clogged nozzle or the failure of sprinklers to revolve.
- It requires a dependable constant supply of water free from slit and suspended matter
- It is suitable for high value crops

3.2.3. Drip Irrigation

Drip irrigation, also known as trickle irrigation, functions as its name suggests. Water is delivered at or near the root zone of plants, drop by drop. This method can be the most water-efficient method of irrigation, if managed properly, since evaporation and runoff are minimized. In modern agriculture, drip irrigation is often combined with plastic mulch, further reducing evaporation, and is also a means of delivery of fertilizer. The process is known as fertigation.

The Advantages of Drip Irrigation include:

- Saves time, money, labor and water because the system is so efficient.
- Prevents fungal disease by minimizing water contact with the leaves, stems, and fruit of plants.
- Discourages weed growth because water is only delivered where it's needed
- Increases effectiveness on uneven ground.
- High efficiency in the use of fertilizers and no runoff of fertilizers into ground water

The Disadvantages of Drip Irrigation are:

- Sensitivity to clogging
- Moisture distribution problem
- Salinity hazards
- High cost compared to furrow.
- High skill is required for design, install and operation.

Water Use Efficiency

Definition: the ratio between effective water use and actual water withdrawal. It characterizes, in a specific process, how effective is the use of water.

3.2.4. Subsurface Irrigation

Subsurface irrigation is similar to the drip/trickle method in that it distributes water through tubes and emitters. But in this method, the tubes are buried below the surface of the ground. Developed in the 1960s in Israel, where water tends to be scarce, this system works best for areas that are arid, hot, windy, or have sandy soil types.

The benefits of subsurface irrigation include:

- Saves water by eliminating surface water evaporation in hot and arid conditions.
- Reduces the number of weeds because water is not on the soil surface where most weed seeds germinate.
- Prevents damage from animals or machinery because the system is below ground.
- Prevents soil erosion which happens in surface irrigation

3.2.5. Centre-Pivot Irrigation

Centre-pivot irrigation involves a self-propelled system in which a single pipeline supported by a row of mobile towers is suspended 2 to 4 meters above ground. Water is pumped into the central pipe and as the towers rotate slowly around the pivot point, a large circular area is

irrigated. Sprinkler nozzles mounted on or suspended from the pipeline distribute water under pressure as the pipeline rotates. The nozzles are graduated small to large so that the faster moving outer circle receives the same amount of water as the slower moving ones on the inside.

Advantages:

- Uniformity of applied water
- No human labor required
- May operate at lower pressure, thus conserving energy
- Reduces the opportunity for surface runoff or deep percolation
- Provides opportunity for fertigation which allows the targeted application of small quantities of nutrients, with a reasonable uniformity of application and less risk of nutrient losses.

Disadvantages:

- Relatively high capital cost compared to surface irrigation systems
- Require some form of energy source (electric or diesel) to operate
- Operation and maintenance of these systems require different skills than surface irrigation
- Not suitable for irrigation of fields of rectangular or square shape

3.2.6. Manual Irrigation

These systems have low requirements for infrastructure and technical equipment but need high labour inputs. Irrigation using buckets or watering cans is to be found, for example, in most rural areas and peri-urban agriculture around large cities.

4. Classification of Irrigation Projects/Schemes

Irrigation projects, in Indian context are usually classified as follows:

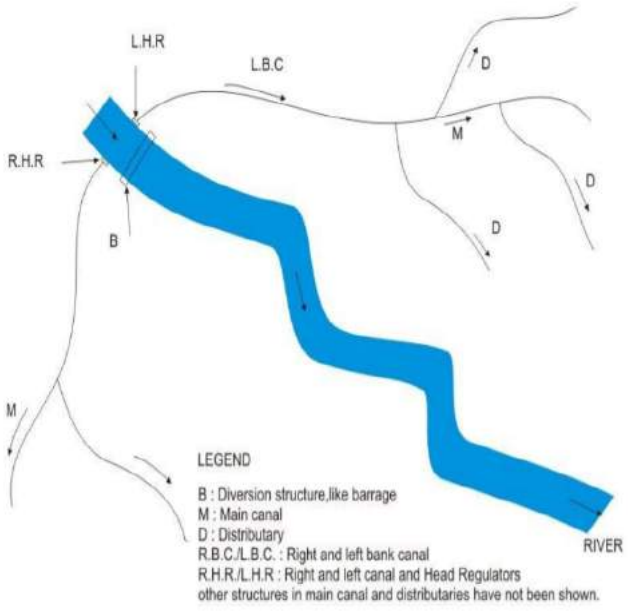
Major project: This type of project consists of huge surface water, storage reservoirs and flow diversion structures. The area envisaged to be covered under irrigation is of the order over 10000 hectares.

Medium project: These are also surface water projects but with medium size storage and diversion structures with the area under irrigation between 10000 hectare and 2000 hectare.

Minor project: The area proposed under irrigation for these schemes is below 2000 Ha and the source of water is either ground water or from wells or tube wells or surface water lifted by pumps or by gravity flow from tanks. It could also be irrigated from through water from tanks.

The major and medium irrigation projects are further classified as:

1. **Direct Irrigation method:** In this project water is directly diverted from the river into the canal by constructing a diversion structure like weir or barrage across the river with



An Example of Direct Irrigation

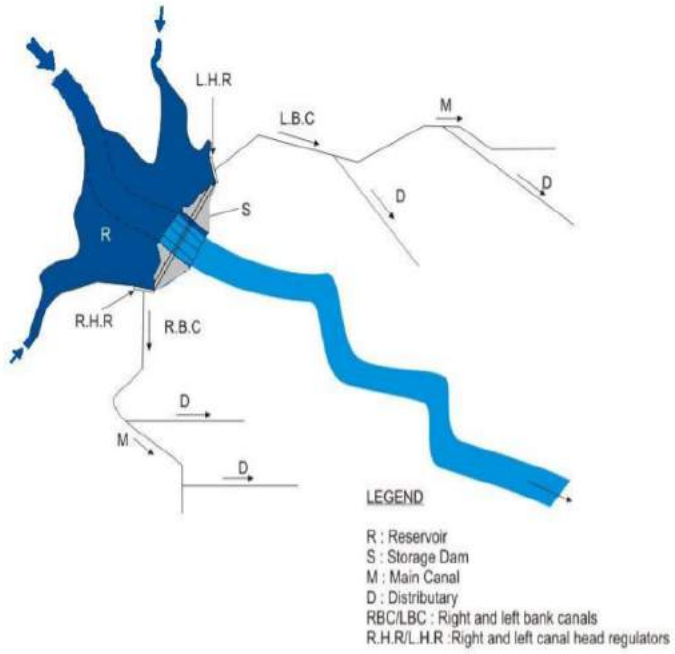
Student Notes:

some pondage to take care of diurnal variations. It also effects in raising the river water level which is then able to flow into the offtaking channel by gravity. The flow in the channel is usually controlled by a gated structure and this in combination with the diversion structure is also sometimes called the headworks.

A direct irrigation scheme of irrigation using river water diversion head works typically be laid out as shown in the adjoining figure.

An example of this scheme is the DVC irrigation project on the Damodar river with the barrage located at Durgapur.

2. **Storage Irrigation Method**: For this type of irrigation schemes part of the excess water of a river during monsoon which otherwise would have passed down the river as a flood is stored in a reservoir or tank found at the upstream of a dam constructed across a river or stream. This stored water is then used for irrigation. This is adopted when the flow of river or stream is in excess of the requirements of irrigated crops during a certain part of the year but falls below requirements or is not available at all in the river during remaining part of the year. Since the construction site of a storage reservoir is possible in regions of undulating topography, it is usually practiced in non-deltaic areas. A general layout of this irrigation scheme may typically be laid out as shown in the adjoining Figure.



An Example of Storage Irrigation Scheme

In **other type** of scheme the storage head works or the dams has to be equipped with ancillary structure like outlet, sluice, spillway, log chutes, etc. The storage created by the dam behind the reservoir is substantial compared to that behind a barrage and may inundate a large tract of land, depending on the topography. The capacity of the reservoir is generally determined systematically by knowing possible withdrawal demands (in this case for irrigation) over the weeks and months of a year and corresponding expected inflows. An example for this type of scheme is the Indira Sagar project on the Narmada River.

Another type of storage irrigation method envisages the storage of water at some place in the hilly terrain of the river where the construction of the dam is possible. A barrage is constructed at some downstream location, where the terrain is flatter and canals take off as in a usual direct irrigation method. A general layout of such scheme could be represented as shown in Figure below.

An example for this type of scheme is the Bhakra-dam Nangal-barrage combination on the river Sutlej.

Student Notes:

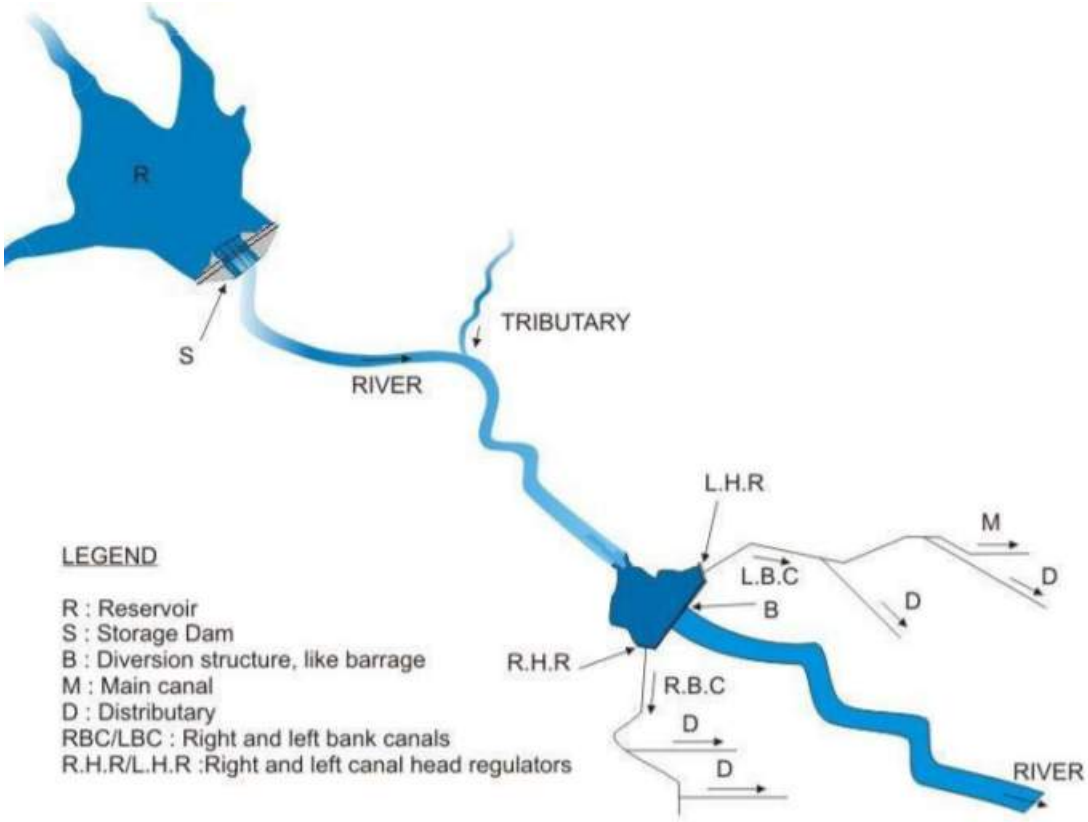


Figure: A Typical Layout of Storage irrigation scheme incorporating a dam with a barrage on its downstream

5. Some Types of Storage Irrigation Systems

1. **Dams**

   A dam is a hydraulic structure constructed across a river to store water on its upstream side. It is an impervious or fairly impervious barrier put across a natural stream so that a reservoir is formed. On the basis of structure, dams can be categorized as:-

   A. **Gravity Dams:** These dams are heavy and massive wall-like structures of concrete in which the whole weight acts vertically downwards. These dams resist the horizontal thrust of the water entirely by their own weight.

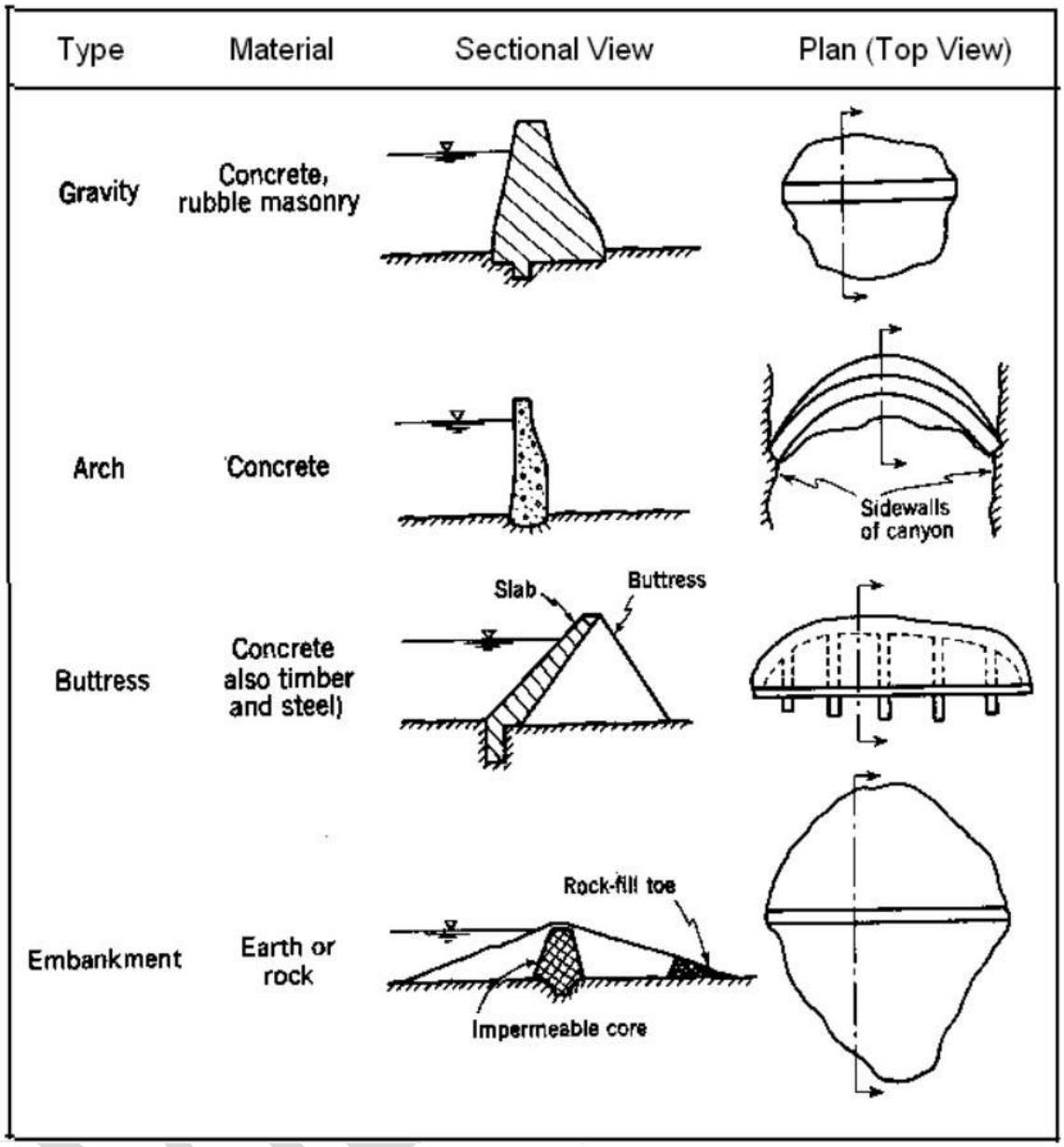
   B. **Buttress Dam:** is a gravity dam reinforced by structural supports. These dams have a solid, water-tight upstream side that is supported at intervals on the downstream side by a series of buttresses or supports.

   C. **Earth Dams:** They are trapezoidal in shape. Earth dams are constructed where the foundation or the underlying material or rocks are weak to support the masonry dam or where the suitable competent rocks are at greater depth.

   D. **Arch Dams:** These are designed so that the force of the water against it, known as hydrostatic pressure, presses against the arch, compressing and strengthening the structure as it pushes into its foundation or abutments.

Student Notes:

Based on structure and design, dams can be classified as follows:



2. Spillways and energy dissipators

Spillway is a channel that carries excess water over or around a dam or other obstruction. An energy dissipator is a device that is used to convert concentrated storm water runoff to sheet flow and is constructed at the end of all storm sewers or channels that outfall into a buffer.

Student Notes:

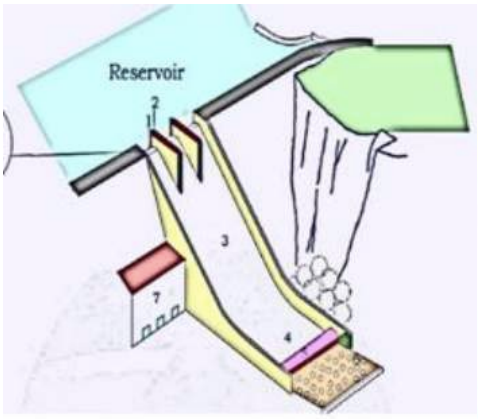
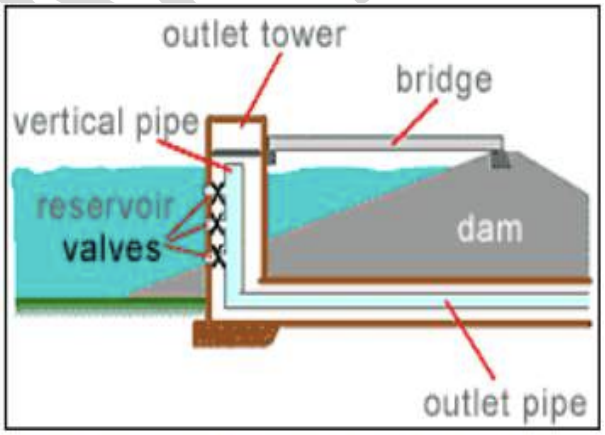


Fig 2. Spillway layout


FIGURE 109: SALAL PROJECT ON RIVER CHENAB SHOWING ENERGY BEING DISSIPATED BY SKI-JUMP BUCKET ENERGY DISSIPATOR

3. Sluices and outlets

A sluice is an artificial channel for conducting water, with a valve or gate to regulate the flow. An outlet is a small structure which admits water from the distributing channel to a water course of field channel. Thus an outlet is a sort of head regulator for the field channel delivering water to the irrigation fields.



Cross-section through an outlet tower

6. Some Schemes Related with Irrigation Systems

6.1. Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

Launched in 2015, PMKSY has been formulated **amalgamating ongoing schemes** viz. Accelerated Irrigation Benefit Programme (AIBP); Integrated Watershed Management Programme (IWMP); and On Farm Water Management (OFWM) component of National Mission on Sustainable Agriculture (NMSA).

Objectives:

- To achieve convergence of investments in irrigation at the field level.
- Expand cultivable area under assured irrigation (har khet ko pani).
- To enhance recharge of aquifers and introduce sustainable water conservation practices.
- To explore the feasibility of reusing treated municipal waste water for periurban agriculture.
- To attract greater private investments in irrigation.

Student Notes:

- To promote extension activities relating to water harvesting, water management and crop alignment for farmers and grass root level field functionaries.

Components of PMKSY

Accelerated Irrigation Benefit Programme (AIBP)	PMKSY (Har Khet ko Pani)	PMKSY (Per Drop More Crop)	PMKSY (Watershed Development)
• Ministry of Water Resources, River Development & Ganga Rejuvenation • Faster completion of ongoing Major and Medium Irrigation including National Projects	• Ministry of Water Resources, River Development & Ganga Rejuvenation • Creation of new water sources through Minor Irrigation (both surface and ground water) • Repair, restoration and renovation of water bodies; • Strengthening carrying capacity of traditional water sources, construction of rain water harvesting structures **(Jal Sanchay)**; Jal Mandir (Gujarat); Khatri, Kuhl (H.P.); Zabo (Nagaland); Eri, Ooranis (T.N.); Dongs (Assam); Katas, Bandhas (Odisha and M.P.) • Command area development	• Ministry of Agriculture • Promoting efficient water conveyance and precision water application devices like drips, sprinklers, pivots, rain - guns in the farm (Jal Sinchan) • Extension activities for promotion of scientific moisture conservation, Crop combination, crop alignment etc., • (ICT) interventions through NeGP -- precision irrigation technologies, on farm water management, crop alignment etc. and also to do intensive monitoring of the Scheme.	• Department of Land resources, Ministry of Rural development • Effective management of runoff water and improved soil & moisture conservation activities • Converging with MGNREGS • DPAP, DDP and IWDP were consolidated under this component • Cluster Approach in selection and preparation of projects • ***Read more on Neeranchal National Watershed Project under Ministry of Rural Development***

Salient Features

- An outlay of Rs. 50,000 Crore over a period of five years (2015-16 to 2019-20) to bring **140 lakh hectares of additional area under irrigation**.
- **Decentralized State level planning and execution**' structure, in order to allow States to draw up a **District Irrigation Plan (DIP) and a State Irrigation Plan (SIP).**
- **Administration**: Inter-Ministerial **National Steering Committee (NSC) under PM** with Union Ministers of all concerned Ministries. A National Executive Committee is to be constituted under the Chairmanship of the Vice Chairman, NITI Aayog to oversee programme implementation.
- **Long Term Irrigation Fund has been instituted under PMKSY in NABARD** for funding and fast tracking the implementation of incomplete major and medium irrigation projects.

6.2. Kisan Urja Suraksha evam Utthaan Mahaabhiyan (KUSUM)

KUSUM scheme was announced in Budget 2018-19.

About KUSUM

- It aims to incentivise farmers to run solar farm water pumps and use barren land for generating solar power to have extra income.
- The total cost of the capacities under this scheme would be Rs 1.4 lakh crore, out of which, the Centre will provide Rs 48,000 crore financial assistance.

Objectives

- To provide financial and water security to farmers.
- Budget 2020-21 has sought to expand the coverage:
  - Scheme to enable farmers to set up solar power generation capacity on their fallow/barren lands and to sell it to the grid.
  - 20 lakh farmers to be provided for setting up stand-alone solar pumps
  - Another 15 lakh farmers to be helped to solarise their grid-connected pump sets

Components of KUSUM

It aims to add a solar capacity of 25,750 MW by 2022. The proposed scheme consists of three components:

- **Component-A:** 10,000 MW of Decentralized Ground Mounted Grid Connected Renewable Power Plants.

Student Notes:

- Renewable power plants of capacity 500 KW to 2 MW will be setup by individual farmers/ cooperatives/panchayats /farmer producer organisations (FPO) on their barren or cultivable lands referred as Renewable Power Generator (RPG).
- The power generated will be purchased by the DISCOMs at Feed in tariffs determined by respective SERC.
- The scheme will open a stable and continuous source of income to the rural land owners. Performance Based Incentives @ Rs. 0.40 per unit for five years to be provided to DISCOMs.

- **Component-B:** Installation of standalone Solar Powered Agriculture Pumps.
  - Individual farmers will be supported to install standalone solar pumps of capacity up to 7.5 Horsepower (HP).
  - It will be mandatory to use indigenously manufactured solar panels with indigenous solar cells and modules.
  - Centre and state to share 30 per cent of pump cost each; farmer to provide the remaining 40 per cent (can access bank loan for up to 30 per cent of the cost)
- **Component-C:** Solarisation of Grid-connected Solar Powered Agriculture Pumps.
  - Individual farmers will be supported to solarise pumps of capacity up to 7.5 HP.
  - Solar PV capacity up to two times of pump capacity in kW is allowed under the scheme.
  - The farmer will be able to use the generated energy to meet the irrigation needs and the excess available energy will be sold to DISCOM.
  - This will help to create an avenue for extra income to the farmers, and for the States to meet their RPO targets.
- **Utilisation of barren land** by farmers to generate **10,000 MW** of solar energy and sell it to grid. For this, discoms would be given 50 paise per unit as generation based incentives to buy power from farmers for five years.
- The government will provide **subsidy** to farmers for buying **17.5 lakh off grid solar farm pumps**. The Centre and the states will provide 30% subsidy each on solar pumps. Another 30% will be met through loans while 10% of the cost will be borne by the farmer.
- **Solarisation of grid-connected farm pumps** involving 7,250 MW capacity.
- **Solarisation of government departments' grid connected water pumps**.

Expected Benefits

- It would help in **de-dieseling of the agriculture sector** which currently uses approximately 10 lakh diesel run pumps. So, it will have substantial environmental impact in terms of savings of CO_2 emissions.
- Help the **financial health of DISCOMs by reducing the subsidy burden** to the agriculture sector.
- Promotion of **decentralised solar power production.**
- Provide water security to farmers through provision of assured water sources through solar water pumps – both off-grid and grid connected
- To support States to meet the renewable purchase obligation targets.
- To fill the void in solar power production in the intermediate range between roof tops and large parks.
- Reduce transmission losses through off-grid systems.

Mission Kakatiya (Telengana)

The mission aims to enhance the development of agriculture-based income for small and marginal farmers, by

- Accelerating the development of **minor irrigation infrastructure**,
- Strengthening **community-based irrigation management** and
- Adopting a comprehensive programme for **restoration of tanks**.

Student Notes:

7. Related Terms

Command area (CA): is defined as the area that can be irrigated by a canal system, the CA may further be classified as under:

Gross command area (GCA): This is defined as total area that can be irrigated by a canal system on the perception that unlimited quantity of water is available. It is the total area that may theoretically be served by the irrigation system. But this may include inhibited areas, roads, ponds, uncultivable areas etc which would not be irrigated.

Culturable command area (CCA): This is the actually irrigated area within the GCA. However, the entire CCA is never put under cultivation during any crop season due to the following reasons:

- The required quantity of water, fertilizer, etc. may not be available to cultivate the entire CCA at a particular point of time. Thus, this is a physical constraint.
- The land may be kept fallow that is without cultivation for one or more crop seasons to increase the fertility of the soil. This is a cultural decision.
- Due to high water table in some areas of the CCA irrigated water may not be applied as the crops get enough water from the saturation provide to the surface water table. During any crop season, only a part of the CCA is put under cultivation and this area is termed as culturable cultivated area.
- The remaining area which is not cultivated during a crop season is conversely termed as culturable uncultivated area.

Intensity of irrigation is defined as the percentage of the irrigation proposed to be irrigated annually. Usually the areas irrigated during each crop season (Rabi, Kharif, etc) is expressed as a percentage of the CCA which represents the intensity of irrigation for the crop season. By adding the intensities of irrigation for all crop seasons the yearly intensity of irrigation is obtained.

8. Previous Years UPSC Mains Questions

1. In what way can floods be converted into a sustainable source of irrigation and all-weather inland navigation in India?
2. What is water-use efficiency? Describe the role of micro-irrigation in increasing the water-use efficiency.
3. What is allelopathy? Discuss its role in major cropping systems of irrigated agriculture.

9. Previous Years Vision IAS GS Mains Questions

1. ***Evaluate the type of irrigation systems in India and related problems due to faulty practices? Suggest a road map to improve the situation.***

Approach:

You have to mention the types of irrigation systems, then you have to discuss the problems associated with each type of irrigation system and give some examples. Then you have to give solutions to that problem.

Answer:

Irrigation is used to assist in the growing crops, maintenance of landscape, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. Various Irrigation system in India are as follows:

- **Border Irrigation**: It uses land formed into strips which are located across the narrow dimension, but sloping along the long dimensions.

Student Notes:

- **Check Basin Irrigation**: In this irrigation system, water is applied to a completely level or dead level area enclosed by dikes or boarders. This requires perfectly level field which becomes a limitation in many cases at fielded level.
- **Furrow Irrigation**: Furrows are sloping channels formed in the soil. Infiltration occurs laterally and vertically through the wetted perimeter of the furrow and plants get water in its root zone.
- **Sprinkler Irrigation**: In this system of irrigation, water is delivered through a pressurized pipe network to sprinklers nozzle or jets which spray water into the air.
- **Drip Irrigation**: It minimizes the use of water and fertilizer by allowing water to drip slowly to the roots of plants
- **Fertigation**: It is the process of application of water soluble solid fertilizer or liquid fertilizer through drip irrigation system.

The main sources of irrigations that are used in various parts of the country are

- **Wells and tube-wells**

  Wells and tube-wells are method by digging a hole in the ground to get the subsoil water. Well irrigation is popular in the areas where sufficient sweet water is available this includes great northern plains, deltaic regions of mahanadi, krishna , godavari, narmada and tapi valleys.

  Problems associated with wells and tube-wells are as follows: Limited area can be irrigated, normally a well can irrigate 1 to 8 hectares of land. Well may be dried up if excess water drain out of it like the water table decline and dark zones have been recently notified by the government due to overuse of ground water resources. Well and tube-wells is not possible in areas of brackish groundwater.

- **Canals**

  It is the second most important source of irrigation in India. It is more effective in the areas of low relief, deep fertile soil, perennial source of water and extensive command area. They are mainly confined to the northern parts of India in Punjab, Haryana and Uttar Pradesh. The digging of canal in peninsular India is difficult and uneconomic. However deltaic regions of south India have some canals for irrigation.

  Problems associated with canal irrigation are - canal water soaks into soil thus leads to the problem of water logging. Excess level of water flow leads to raising of ground water level .capillary action brings alkali salts on the surface leads to the process of alkalinity, floods in surrounding areas during rainy season, it is suitable in plain areas only

- **Tanks**

  This is popular in peninsular parts of India.

  Problems associated with tank irrigation are - they dry up during the dry season when it is needed the most, silting, operational cost is high, water evaporation for large expanse, they cover large areas of cultivable land, lifting of water from tanks and carrying it to the fields is a strenuous and costly.

  To improve the irrigation system in India there is an urgent need to improve the mechanism at three levels at the entry level, storage level and at the exit or the use value level. Three pronged strategy to tackle this problem:

  1) To maintain the catchment area by improving the catchment area of any lake, tank, reservoir. Its conservation with maintenance and construction of the physical structures required for the conservation, management and functioning irrigation system.

Student Notes:

2) To maintain the required level of carrying capacity that what has been prescribed for its functioning thus to maintain the potential of water holding capacity by these structures. It is the improvement in the water retention capacity and water storage enhancement through the addition of new structures and proper maintenance of the existing once.
3) To improve the water use efficiency in the region to manage the irrigation system. This aspect will consider the methods that need to be taken care of such sprinkler irrigation, drip-irrigation, and enhancement in water use efficiency by the application of drought resistance crops and by the development of new ways of crops and plough methods that conserve water.

Specific suggestion to improve the various irrigation system:

Well and tube wells irrigated region: The problem in this region is the water recharge capacity need to be developed by the efficient utilization of funds under the integrated water-shed management programme. There is a need to regulate the number, distribution and use of water in the tube well irrigated regions such as Punjab, Haryana, Rajasthan. Formation of dark zones due to over exploitation water needs to be controlled. There is a need to create the ground water recharge structure such as check dams. Formation of roof top-harvesting, run-off harvesting techniques by making the construction of these structures compulsory to all the owners of the irrigated system. Need to regulate the flat price policy of electricity as followed in Punjab to control the mis-utilization of government subsidies in this sector.

Canal irrigated regions Major problem are related to the over irrigation. The problem of water logging can be solved by the technique of sprinkler irrigation, drip irrigation rather than flood irrigation method. There is a need to manage the cropping pattern in the canal irrigation area such as rice is grown in the semi-arid areas of southern Punjab, southern Haryana etc. De-silting of the canals regularly can maintain the flow of water to the tail ends of the canal. There is a need to enhance the water use efficiency to distribute the water judiciously to various parts of canal irrigation system. The new experiment of Gujarat is the covering of canal by solar penal is helpful in preserving water from evaporation and the supply of solar power to the nearby areas.

Tank irrigated regions- To stop the siltation of tanks there is a need to maintain the plantation of trees, afforestation, restoration of nearby catchment areas by the application of MNREGA fund for the construction of tank areas, with the people participation we can improve the situation of dredging before every monsoon period. We have to develop new varieties of crops that are drought resistance and temperature resistance. Proper timely maintenance and covering of open area tank can also be followed. And last but not the least is the water use efficiency in dry areas has to considered by making regional water policy by proper auditing of water use and its utilization for the future roadmap of irrigation improvement.

There is an urgent need to improve the irrigation techniques according to the agro-climatic regions of India and subject to the topographical features and the potential to use those techniques effectively and efficiently.

2. Discuss the significance of micro-irrigation in a situation of water crisis in India. Also, mention the challenges with regard to adoption of micro-irrigation systems in India.

Approach:

- Briefly explain water scarcity in India and need for efficient irrigation technologies.
- Explain significance of micro-irrigation for India.
- Mention the challenges related to adoption of micro-irrigation systems.
- Conclude with a way forward.

Student Notes:

Answer:

India accommodates more than 17% of the world population and only 4% of fresh water resources, out of which around 80% is used in agriculture alone. This calls for efficient irrigation technologies to increase water productivity.

Micro-irrigation (MI) techniques such as drip irrigation, sprinkler, rain-gun, porous pipe system etc. where water is supplied directly to the crops is considered as an innovative water saving technology.

Significance of micro-irrigation for India:

- **Water use efficiency:** It helps in significant reduction of water loss due to runoff, evaporation etc. It further aids soil health management and prevents water logging. This is significant for India where agriculture is largely rain-fed and faces vagaries of aberrant monsoons, soil degradation, nutrient deficiencies and declining groundwater table.
- **Energy efficiency**: It can effectively save power due to less water use and thereby reduction in energy requirements for pumping groundwater.
- **Fertilizer use efficiency:** Proper mixing of fertilizers and water, control of optimum dosage and direct application of fertilizers to the root zone result in the saving in fertilizer consumption. This is significant for India where food and fertiliser gets highest subsidy allocation and non-judicious application of fertiliser is reducing soil fertility in many regions.
- **Increase in productivity:** It increases the crop yield (quantity and quality). Increasing population and water scarcity demands increased productivity in the long run. An increase in productivity would also support doubling farmers' income.
- **Irrigation cost saving:** It will reduce the overall cost of irrigation in long-term due to decrease in labour requirement for irrigation, land-levelling, weeding and fertilizer application.
- **New crop introduction**: An improved water scenario helps in addition to new crops or promotes inter-cropping. Moreover, the reduction in spacing between the plants helps in accommodating more numbers of plants.
- **Infrastructure development**: Infrastructure of MI systems can be created in months unlike other systems where it takes years to develop infrastructure such as dams, canals, etc.

That's why MI has been given special importance in Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) with the aim of extending irrigation cover ('Har Khet Ko Pani') and improving water use efficiency ('Per Drop More Crop'). However, despite promoting MI through heavy subsidies, the coverage under MI is less than 15% of the potential.

Following challenges exist in its widespread adoption:

- **High initial cost:** The cost of initial setup is too high which is not feasible for over 85% Indian farmers who are small and marginal.
- **Energy crisis:** Power outages, voltage fluctuations and unscheduled interruptions exist across rural and urban India.
- **Policy concerns:**
  - Delays in subsidy disbursement largely because of approving installation of equipment when funds for subsidy aren't yet available.
  - GST rate on drip irrigation systems exists at 12%.
  - Widespread private investment is missing.
- **Technical Support:** There is lack in support for maintenance (for example, rodent attack on piping, pore-clogging) and operation.

In that context, many studies have suggested promotion of cost-effective alternatives, relaxation of farm size limitation in providing micro-irrigation subsidies and creation of a single state-level agency or a special purpose vehicle (SPV) for speedy implementation of the micro-irrigation program.

3. Highlighting the need for Participatory Irrigation Management (PIM) in India, discuss the constraints in implementing PIM.

Approach:

- Introduce by explaining the Participatory Irrigation Management (PIM).
- Highlight the need for its adoption.
- Discuss major challenges in operationalizing PIM in India.
- Give a brief conclusion.

Answer:

Participatory irrigation management (PIM) refers to the co-operation and involvement of farmers in **operation, management, and maintenance** of the irrigation systems by organizing themselves in formal bodies at various levels. For instance, Water Users' Association (WUA), that will have a delineated command area, a Distributary Committee that will comprise of 5 or more WUAs and a Project Committee that will have an apex committee of an irrigation system and presidents of the Distributary committees in the project area.

Need for Participatory Irrigation Management (PIM) in India

- **Need for Increase in Agricultural Productivity:** Proper irrigation management is critical for much needed increase in productivity, food production, alongside growth and competitiveness on the agricultural market**.**
- **Operations & Management (O&M) cost and recovery of irrigation charges:** High O&M cost & cost of recovery of water charges vis-à-vis recovered charges causes severe budget constraints to Government that leads to poor management of irrigation infrastructure.
- **Problem of fiscal availability:** Collective responsibility emphasised by PIM is necessary to reduce the pressure on government finances, by saving up on high costs related to operation and maintenance of irrigation systems.
- **Other compulsions:** There are other compulsions like timely availability of water, immediate problems like leakages, adopting flexibility in water distribution etc. for which, PIM appears extremely necessary.

Constraints in implementing PIM

- **Lack of legal backup and policy changes:** In many States, there is no or very little legal back up and clear-cut policy decisions at the Government level to take up PIM.
- **System deficiency:** Deterioration of old control and measuring structures, leakages and seepage at various places, erosion of banks and beds, siltation and weed infestation etc. hinders the takeover of the system management by farmers.
- **Uncertainty of water availability:** Farmers are reluctant to take on the responsibility for managing the system unless deliveries of water are made reliable, flexible, practical and responsive to need.
- **Fear of financial viability:** Farmers are apprehensive about timely availability of funds necessary to fulfill the requirement for operation and maintenance.
- **Lack of technical knowledge:** Lack of technical input is one of the inhibiting factors to take over the system.

- **Lack of leadership:** There is a lack of potent local leadership which often leads to negative or unclear guidelines creating further misunderstanding among farmers.
- **Mega irrigation projects:** In comparison to other nations, irrigation projects under PIM in India are huge, which enhances complexity in their maintenance, operation and management aspects.

Thus, there is a need to work upon some fundamental factors, such as common interest and collective efforts of water users, effective leadership of office bearers, capacity building of farmers and irrigation officials, political will of the party in power, proper monitoring and evaluation, catalyzing the role of the change agents etc.

4. Unscientific use of irrigation water is giving rise to a variety of ecological problems in India. Elucidate.

Approach:

- Introduce the answer by giving a brief highlight of present scenario of irrigation in India.
- Explain in brief the issue of unscientific use of irrigation water.
- Enlist the ecological hazards resulting from the same.
- Conclude by giving a way forward.

Answer:

Irrigation consumes about **84 percent** of total available water in India, while industrial and domestic sectors consume about 12 and 4 percent respectively. India has already realized over **80% of its irrigation potential**. While this reflects significant irrigation expansion, unscientific utilization of irrigation water has raised several issues.

There are multiple factors contributing to unscientific use of irrigation water like **low irrigation efficiency; poor water management; ineffective ground water policy; heavy subsidisation in electricity etc.** Injudicious use coupled with high disparity in the sources of irrigation water (Groundwater 62%, Canals 24%) and irrigation efficiency amplify ecological, agrarian, economic and humanitarian consequences.

Ecological problems resulting from unscientific irrigation:

- **Salinisation, Alkalisation and Waterlogging**: Faulty irrigation practices and absence of proper and adequate drainage facilities are not only responsible for wastage but also increased salinity and alkalinity. This causes land degradation and creates conditions adversely affecting root health of plants.
- **Disappearance of important ecosystems:** Large irrigation projects which impound or divert river water cause major environmental disturbances. Reduced river flow may cause disappearance of ecologically and economically important wetlands or flood forests.
- **Coastal erosion and Salt water intrusion:** Interception for irrigation and consequent reduction of river flow results in reduced discharge of water into the sea. This may cause coastal erosion and salt water intrusion in the river and into the groundwater of adjoining land resources.
- **Reduced downstream water quality:** Upstream land use affects the quality of water entering the irrigation area and also reduces the water supply for downstream ecosystems.
- **Impact on biodiversity:** Dissolution of nutrients in drainage water as it moves through soil profile leads to a buildup of those nutrients in the ground-water aquifer. High nitrate levels in drinking water can be harmful to humans and other species. Besides, increased nutrient levels may result in algal blooms, and affects aquatic life.

- **Changes in land use:** It may change land use patterns, increase livestock pressure on remaining lands, induce overgrazing and subsequent soil erosion.
- **Vulnerability to climate change**: Depleting water tables and over extraction worsen uncertainties owing to climate change.
- **Instability in rainfall patterns:** Excessive evaporation owing to unscientific irrigation may result in atmospheric changes impacting rainfall.

Sound water management must be promoted through policy changes, technology based modern practices such as drip irrigation, precision farming etc. Research, scientific evaluations and consultation with all stakeholders must be done before policy formulation. The role of communities in water management must be encouraged. Schemes & practices such as **PM Krishi Sinchai Yojana, vertical farming, dryland farming** can address the problems of overall irrigation efficiency. Such initiatives shall help in achieving **sustainable irrigation objectives under sustainable development goal**.

5. While access to irrigation is important, efficiency of water use is equally, if not more, crucial. Examine.

Approach:

- Briefly examine the importance of ensuring access to irrigation.
- Broadly establish the need to ensure water use efficiency in agriculture.

Answer:

Irrigation plays a protective role against vagaries of rainfall and drought. With the adoption of high yielding varieties, chemical fertilizers and multiple cropping, highly controlled irrigation is quintessential for productive agriculture. It also paves the way for optimal utilization of cultivable wasteland for cultivation. However, in a water stressed country where agriculture accounts for about 70 percent of total usage of water, it is imperative that use of water be made efficient by increasing its absorption and reducing its wastage.

Water use efficiency indicates the ratio between effective water use and actual water withdrawal. It is to used describe how effectively water is delivered to crops and to indicate the amount of water wasted at plot, farm, command, or system level.

Currently, around 52% farm field i.e. 73.2 million hectares out of 141.4 million hectares net sown area is still un-irrigated in India. As such, ensuring access to irrigation is pertinent to lessen the regional & size-class inequalities in agricultural productivity which directly impacts socio-economic imbalances.

With availability of irrigation, rice yields in Punjab and Haryana have been highest in the country (comparable to China). Also, they have increased substantially in hitherto low yield areas of Chhattisgarh and Jharkhand. However, the amount of water used in Punjab is about 3 times more than used in Jharkhand. This shows that with improving water use efficiency, higher yields can also be obtained.

Importance of Water Use Efficiency:

- Diversification of economy away from agriculture, rising population and increasing urbanization, has intensified inter-sectoral competition for water in developing countries like India.
- Agriculture sector accounts for 78 per cent of freshwater use in water-stressed country like India and total evapotranspiration could double in next 50 years if trends in food consumption and current practices of production continue.

Student Notes:

- Vulnerability of agriculture to natural disasters like drought is likely to increase with climate change, making it furthermore important to efficiently utilize the scarce water resources.
- Due to poor agro-climatic planning, cropping patterns show a mismatch with the irrigation water potential of that area (particularly for water guzzler crops like rice and sugarcane). For example relatively water abundant eastern states of India, lag behind in the production of rice and sugarcane. Water presents itself as a more binding constraint to Indian agriculture than land.

Investing more in augmenting irrigation infrastructure may not serve the purpose fully unless it is accompanied by policies and programmes that promote higher water-use efficiency in agriculture. Recently NABARD Report pointed out the need to shift from crop productivity to water productivity implying that there is a need to realign the focus from maximizing productivity per unit of land area to per unit of water, thus achieving 'more crop per drop'.

This may be achieved by promoting drip and sprinkler irrigation systems, robust agro-climatic planning, watershed development and water harvesting & management projects. The future lies in making agriculture water-smart, water-secure and environmentally sustainable.

Student Notes:

FOOD PROCESSING AND RELATED INDUSTRIES IN INDIA – SCOPE AND SIGNIFICANCE, LOCATION, UPSTREAM AND DOWNSTREAM REQUIREMENTS, SUPPLY CHAIN MANAGEMENT

Contents

Student Notes:

1. Food Processing Industry

Food is a very important part of a civilization. It is characterized by any plant or animal product which is consumed for nutrition and sustenance. Since the collection, preparation and distribution of food has been the very basis of civilization, culture and home, humanity has always recognized the value of preserving food.

This preservation of food ensures availability in times of need by means of pickling, salting, drying, etc. Therefore, food processing is a multi-faceted endeavor and has increased importance for an agriculture economy and society like ours. Food processing basically takes harvested crops (or animal products) and adds value to them using different techniques to produce long shelf-life food products.

What is Processed Food?

As defined by the inter-ministerial stakeholder meeting, processed food pertains to the following two processes:

- **Manufactured Processes**: If any raw product of agriculture, animal husbandry or fisheries is transformed through a process (involving employees, power, machines or money) in such a way that its original physical properties undergo a change and if the transformed product is edible and has commercial value, then it comes within the domain of processed food.
- **Other Value-Added Processes:** If there is significant value addition (increased shelf life, shelled and ready for consumption etc.) such produce also comes under processed food, even if it does not undergo manufacturing processes.

1.1. Why Food Processing Industry?

The Food Processing Industry all over the world provides vital linkages between the two important pillars of the economy- agriculture and Industry. Thus, it has a direct impact on the lives of the people as well as the environment. The significance of FPI can be understood through the following points:

- **Reducing food wastage**: United Nations estimates that more than one-third of food is wasted globally. Similarly, NITI Aayog estimated annual post-harvest losses of close to Rs. 90,000 crore. By diverting extra harvest to FPI, this wastage can be curbed.
- **Reduce malnutrition**: Fortification of processed foods with vitamins and minerals raises the nutrition levels of the population.
- **Preserve food quality and increase shelf life**: By preventing the spoilage due to fungus, bacteria and pests.
- **Employment generation**: The FPI sector provides direct and indirect employment opportunities as it is labour as well as technology-intensive sector.
- **Increasing farmer income**: As the demand for processed food increases, so will the demand for raw farm materials, and thus the income of the farmers will increase.
- **Crop Diversification**: With a growing market, farmers will be incentivised to grow a variety of crops, practice mixed farming etc.
- **Curbs Food Inflation**: Since the shelf life is increased, the food is available throughout the year and keep a check on food inflation.
- **Gender Empowerment**: As FPI is related to animal husbandry where 70% workers are women workers.
- **Increase exports**: High-quality food products are valued all over the world, thus bringing in much-needed forex. For eg: India's Basmati Rice.
- **Enhances consumer choices:** Today, food processing allows food from other parts of the world to be transported to our local market and vice versa.
- **Curbing Migration:** Agricultural resources in India provides employment in rural areas, hence reduces relocation from rural to urban and resolves issues of urbanization.

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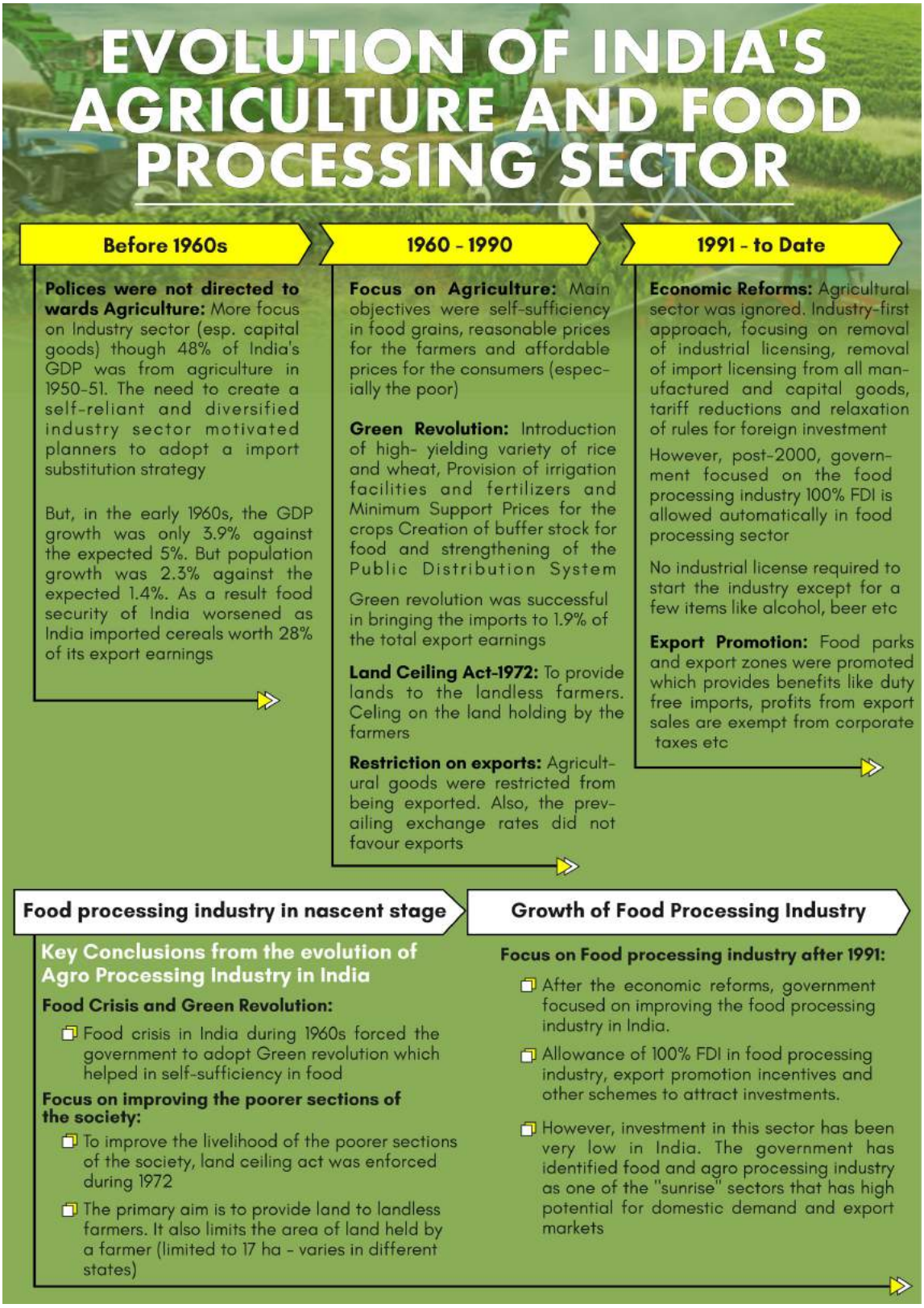
2. Evolution of the Food Processing Sector in India



3. Location of food processing industries in India:

Food processing sector in India is a composite sector comprising two broad segments viz. organized and unorganized segments.

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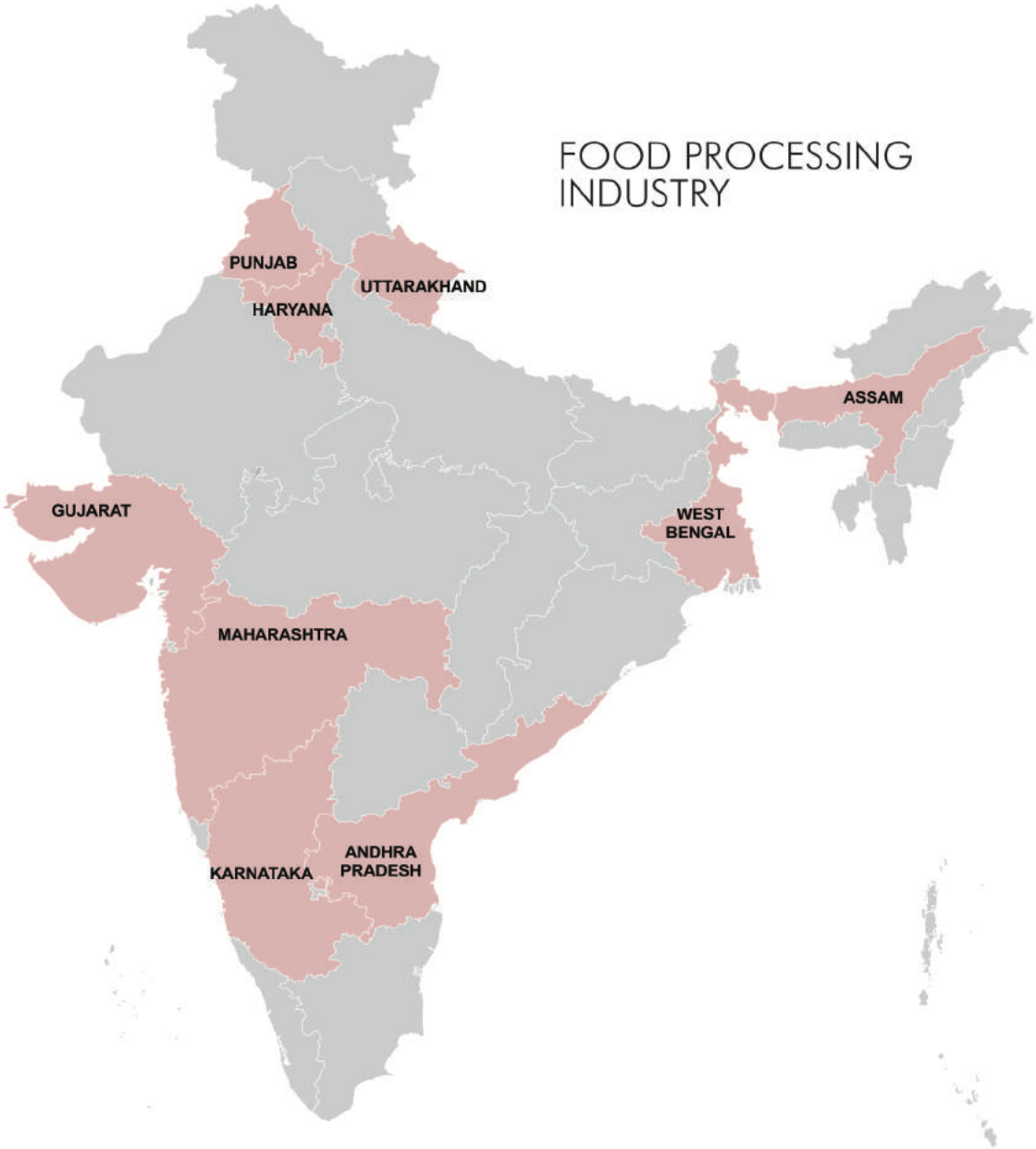
There are an estimated 25-lakh micro food processing enterprises in the country, which are unorganized and unregistered. With 7% of investment in plant & machinery, the unorganized enterprises contribute of 74.3% of employment (a third of which are women), 10% of output and 27% of value addition in the food-processing sector. Nearly 66 per cent of these units are located in rural areas and about 80 per cent of them are family-based enterprises.

The organized sector with nearly 40,000 units accounts for 93% of the plant & machinery in the sector, in value terms. This segment accounts for 26% of employment and contributes around 90% of output and 72% GVA.

Most of the food processing factories are concentrated in the coastal states due to accessibility to marine food processing. Major coastal states includes: Andhra Pradesh, Maharashtra, Karnataka, Gujarat, West Bengal etc. Major non-coastal states includes: UP, Punjab, Haryana etc.



Items under the purview of Food Processing Industries in India

Food processing is a large sector that covers activities such as agriculture, horticulture, plantation, animal husbandry and fisheries. It also includes other industries that use agriculture

Student Notes:

inputs for manufacturing of edible products. Based on International Standard Industrial Classification, it has been assumed that the factories listed in the following groups can be summed up to constitute Food Processing Industries.

S.No	NIC Group	Description
1	151	Production, Processing and Preservation of Meat, Fish, Fruits, Vegetables, Oils and Fats
2	152	Manufacturing of Dairy Products
3	153	Manufacture of Grain Mill Products, Starches and Starch products and prepared animal feeds.
4	154	Manufacture of Other Food Products.
5	155	Manufacture of Beverages.

The above groups also include food products which are under the mandate of Ministries other than Ministry of Food Processing as well

Source: Data Bank on Economic Parameters of the Food Processing Sector

***NIC – National Industries Classification**

4. Supply Chain of the Food Processing Sector

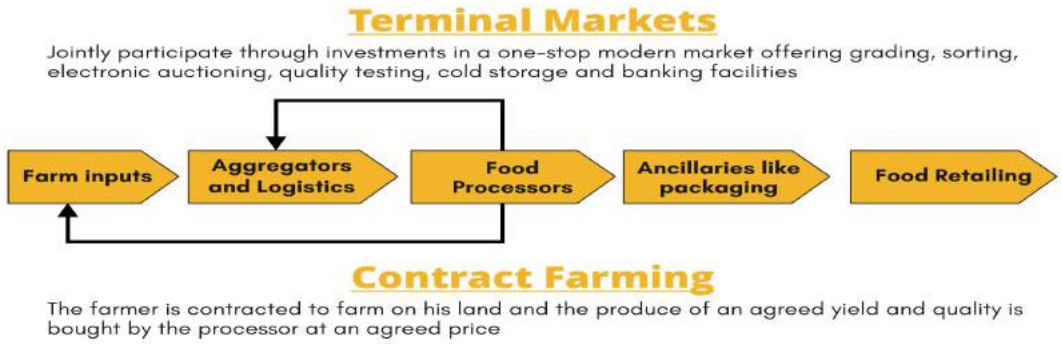
A *supply chain* is a network between suppliers (farmers) of raw material, company (food processor) and distribution network to market the finished products. *Supply chain* represents the steps it takes to get the product or service to the customer.

The different stages of processing of manufactured food products are as follows:

Source: Data Bank on Economic Parameters of the Food Processing Sector

- **Primary Processing**: cleaning, grading, powdering and refining of agricultural produce, e.g., grinding wheat into flour.
- **Secondary Processing**: basic value addition, e.g., tomato-puree, ground coffee, processing of meat products.
- **Tertiary Processing**: high value addition products like jams, sauces, biscuits and other bakery products ready for consumption.

The generic value chain of the food processing industry from raw materials to retail to the consumer is shown below in the figure:



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4.1. Upstream and Downstream Requirements:

Often, the different stages within the supply chain are referred to as upstream or downstream.

Upstream operations are those in which the materials flow into the organization. This process includes searching for and extracting raw materials. The upstream part of the production process does not do anything with the material itself, such as processing the material. This part of the process simply finds and extracts the raw material. Therefore, any industry that relies on the extraction of raw materials commonly has an upstream stage in its production process

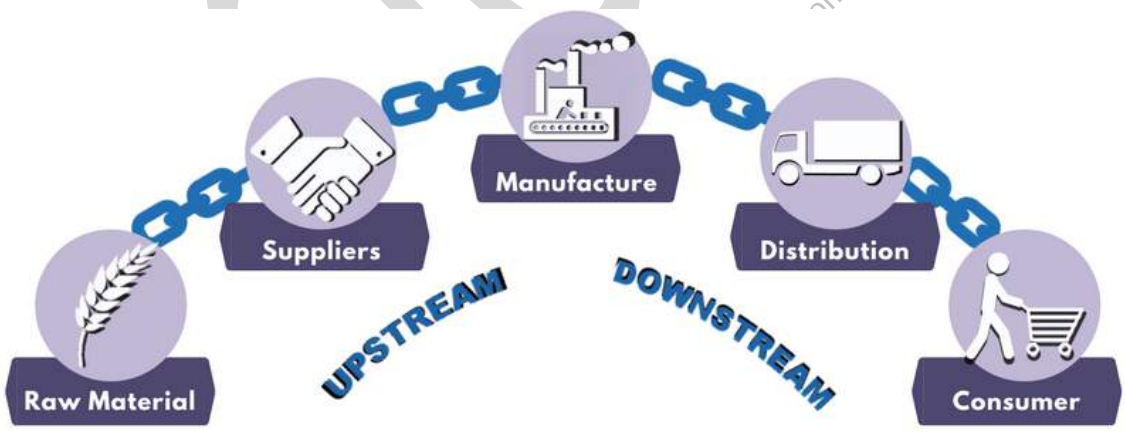
Upstream requirements include:

- Accessibility to raw materials.
- Modern extraction techniques.
- Good linkages with farmers.
- Storage facilities for raw materials like Grains, Meat, and Fish.
- Quality testing facilities.
- Transport facilities.
- Work force

Downstream operations are those in which materials (mostly in the form of finished products) flow away from the organization to the customers. This process involves processing the materials collected during the upstream stage into an ended product. The downstream stage further comprises of the genuine sale of that product to other businesses, governments or private individuals. Downstream process has direct contact with customers through the finished product.

Downstream requirements include:

- Latest processing techniques.
- Latest processing machinery.
- Quality testing facilities.
- Organized retail stores for faster distribution.
- Work force.



Similarly, the term logistics is used when talking about a business's supply chain. Inbound logistics are related to the upstream activities and include all of the movement of the product before manufacturing. They involve receiving materials, storing them, and the manufacturing processes required to produce the product. Of course, outbound logistics are related to the downstream operations involving just about all of the movement of the product once it is a finished good.

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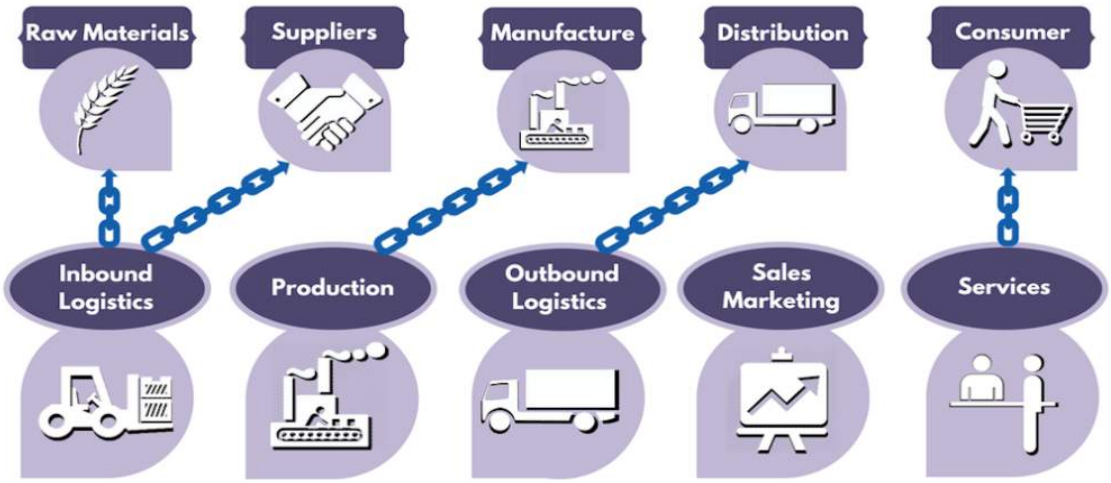


4.2. Backward and Forward Linkages

Linkages are a phenomenon which measures the capability of an industry to generate demand for the products of/in the other industries. From the point of view of development strategy, linkages are one of the essential features of an industry. Linkages are of three types: Forward, Backward and sideways.

Backward Linkage: It means the connectivity of the FPIs with sources of raw material supply. For example, supply of raw material like tomatoes to a ketchup manufacturer.

Forward Linkage: It means the connectivity of FPIs with the markets through distribution network comprising of physical infra like storages, road and rail network etc.

Sideways Linkage: Sideways linkages are mostly derived from the use of by products and waste products of the main base industrial activity. For example: many food processing industries using agricultural raw materials produce waste that can be used further in production of fuel, bio-fuels, paper pulp and fertilizer.

Significance of Linkages

- It encourages and enables farmers to grow products of appropriate quality.
- It helps the farmers fetch appropriate and remunerative return for their produce especially the marginal and medium farmers.
- It helps to reduce the food wastage especially of perishable products with low shelf life like fruits, vegetables, dairy products etc.
- It ensures timely delivery of food products to the consumer markets.
- High quality products and better infrastructure results in cost saving and enhanced efficiency.
- These links provide a level playing field for all stakeholders and aid in facing competition.
- Helps to improve hygiene and food safety standards leading to greater acceptability of processed food domestically and in international market.

Existing Challenges in Establishing Robust Linkages

- Small and dispersed marketable surplus due to fragmented holdings
- High seasonality of raw material production
- Large number of intermediaries
- Poor infrastructure facilities like cold storage, transport facilities, electricity etc.
- Industry is highly fragmented and is dominated by the unorganized sector
- Substandard levels of processing industries

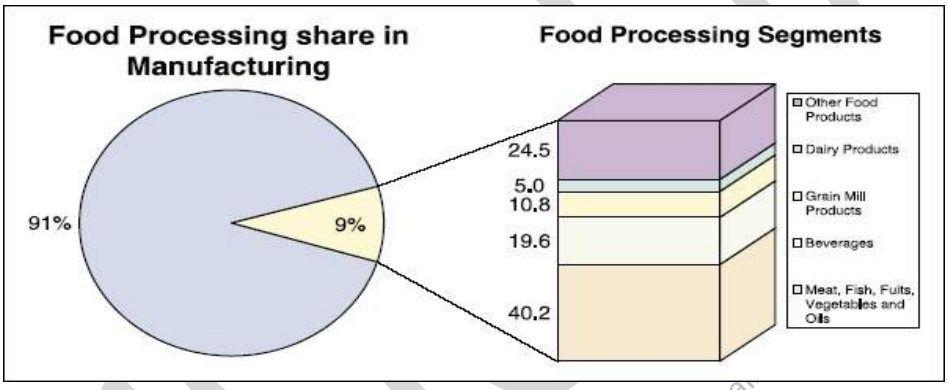
- Inadequacy of information with farmers and small processors.
- Multiplicity of legislation leads to contradictions in specifications, conflicting approach, lack of co-ordination and administrative delays.
    - For instance, manufacturers of packaged food products such as jams and squashes are obligated to comply with quality standards and label declarations prescribed under multiple legislations, such as The Standards of Weights & Measures (Packaged Commodities) Rules, Prevention of Food Adulteration (PFA) and Fruit Products Order (FPO)
- Anomalies in domestic food laws with international food safety standards
- Under developed food testing network.

5. Scope and Significance of the Food Processing Sector in India

With India moving from a position of scarcity to surplus in terms of food production, the opportunities for increasing food processing levels are innumerable.

The scope of Food Processing sector encompasses the existing scale of operations/size of industry as well as the future potential to grow. The scope can be gauged from the following:

- According to the Annual Survey of Industries 2018-19 report, the Food Processing industry constituted around 9% to India's GVA through manufacturing.



- The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales.
- It is the fifth largest industry in our country in terms of production, consumption, export and growth.
- The food processing market in India was valued at around US$ 350 billion in FY 2018 and is expected to double by FY 2024, expanding at a CAGR of around 12.09% during the FY 2020-FY 2024 period.
- India is a country with a population of over 1.3 billion. With rising middle class having a considerable disposable income, the domestic market offers significant demand opportunities.
- 100% FDI is allowed in the sector. The Confederation of Indian Industry (CII) estimates that this sector has the potential to attract as much as US $33 billion of investment over the next 10 years and also to generate employment of nine million person-days.

- India ranks no. 1 in the world in the production of milk, spices, ghee, ginger, bananas, guavas, papayas and mangoes. Further, India ranks no. 2 in the world in the production of rice, wheat and several other vegetables & fruits. If the surplus production of cereals, fruits, vegetables, milk, fish, meat and poultry, etc. are processed and marketed both inside and outside the country, there will be greater opportunities for the growth of the sector.
- More than 70% of the FPI is spread in the unorganised sector in the form of the cottage and small industries. So, there is a lot of scope of bringing them under the organised sector.

6. Potential of Processed Food Sector in India

The food processing market in India is a Sunrise Industry with high potential for growth which can be witnessed through following:

- **Demand:** With a population of more than 1.3 billion individuals and food constituting a major part of the consumer's budget, this sector has a prominence next to no other businesses in the country.
- **Resilience:** The importance of this sector to India's economy becomes all the more relevant, considering the fact that this sector continued to perform well, despite fall in GDP number and poor performance by many other industries, during recession in 2008-09.
- **Value Chain:** The industry encompasses a gamut of activities involved in reaching the final product to the consumer, starting with farming activity to produce inputs, processing of the inputs to create products and the associated supply chain involved in delivering the products.
- **Forward-Backward Linkages:** It has increasingly come to be seen as a potential source for driving the rural economy as it brings about synergy between the consumer, industry and agriculture. A well-developed food processing industry is expected to increase farm gate prices, reduce wastages, ensure value addition, promote crop diversification, generate employment opportunities as well as export earnings. This sector is also capable of addressing critical issues of food security and providing wholesome, nutritious food to our people.
- **Scope for development:** While the industry is large in terms of size, it is still at a nascent stage in terms of development. Out of the country's total agriculture and food produce, only 2 per cent is processed. However, the contribution of food processing sector to GDP has been growing faster than that of the agriculture sector.
- **Raw material:** Being an agrarian economy, there is sufficient supply of raw material in India.
- **Export Competitiveness**: We have a comparative advantage in exports because the cost of raw materials is cheap in India as compared to other countries. But this is not being realised due to barriers like safety and hygiene standards. The government is liberalizing and taking up measures in this regard.
- **Employment generation:** It has the potential to generate non-farm employment, especially in rural areas. It would reduce disguise unemployment by providing productive employment opportunities.

  Investments: With 100 per cent FDI allowed into the sector through the automatic route by Government of India & ease of doing business, India's food processing sector attracted global investors as it received FDI inflows worth US $904.70 million in the 2019-20 (up by 44 per cent over 2018-19). These investments serve as a catalyst to boost agricultural income and employment.

7. India's Strengths in the Food Processing Sector

India's strengths in the food processing sector lie in the following:

- **Favourable-Factor Conditions**

  India has access to several natural resources that provides it a competitive advantage in the food processing sector. Due to its diverse agro-climatic conditions, it has a wide-ranging and

Student Notes:

large raw material base suitable for food processing industries. Presently a very small percentage of these are processed into value added products. The semi-processed and ready to eat packaged food segment is still evolving.

India's comparatively cheaper workforce can be effectively utilized to set up large low cost production bases for domestic and export markets. Cost of production in India is lower by about 40 per cent over a comparable location in EU. Along with these factor conditions, India has access to significant investments to facilitate food processing industry. There have been increasing investments not only by domestic firms and Indian government, but also foreign direct investment.

- **Related and Supporting Industries**

  The Indian food processing industry has significant support from the well-developed R&D and technical capabilities of Indian firms. India has a large number of research institutions like Central Food Technological Research Institute, Central Institute of Fisheries Technology, National Dairy Research Institute, National Research and Development Centre etc. to support the technology and development in the food processing sector in India.

- **Government Regulations and Support**

  The Government of India has taken several initiatives to develop the food processing industry in India. The government has been developing agri-zones and mega food parks to promote food processing industry in India. In order to promote investment in the food processing sector, several policy initiatives have been taken during recent years, such as allowing 100% FDI.

- **Large Number of Players**

  There are a large number of players in the organized as well as unorganized sector. The organized sector is small but growing - for example, it forms less than 15 per cent of the dairy sector and around 48 per cent of the fruits and vegetable processing. The sector offers potential for growth and a large number of Multi-National Corporations have entered into India to leverage this opportunity.

Apart from above-mentioned strengths, the following areas have been identified by the Ministry of Food Processing Industries where investments are required:

- Mega food parks,
- Agri-infrastructure and supply chain integration,
- Logistics and cold chain infrastructure,
- Fruit and vegetable products,
- Animal products, meat and dairy,
- Fisheries and sea food,
- Cereals, consumer foods and ready-to-eat foods.
- Wine and beer,
- Machinery and packaging etc.

8. Factors that can help in success of Food Processing Sector in India

The Indian food processing industry's growth potential cannot be disputed; however, it requires certain competencies and success factors to fructify this potential. These include addressing the current gaps in the value chain as well as leveraging on the various advantages the country provides. Some of the key success factors are discussed below.

Student Notes:

- **Integrated Supply Chain and Scale of Operations**
  While India ranks second in production of fruits & vegetables, nearly 20 to 25 per cent of this production is lost in spoilage in various stages of harvesting. The key issues are poor quality of seeds, planting material and lack of technology in improving yield. Ensuring good quality produce entails investments in technology and ability to sustain a long gestation period for the harvest. Good quality production also results in better quality of processed fruits. Hence there is a need to establish backward linkages with the farmers with the help of arrangements such as contract farming to improve the quality of the produce. Scale is a key factor in the processing industry. Nearly 90 per cent of the food processing units are small in scale and hence are unable to exploit the advantages of economies of scale. This is also true with land holdings.
- **Processing Technology**
  Currently, most of the processing in India is manual. There is limited use of technology like pre-cooling facilities for vegetables, controlled atmospheric storage and irradiation facilities. This technology is important for extended storage of fruits and vegetables in making them conducive for further processing. In the case of meat processing, despite the presence of over 3600 licensed slaughter-houses in India, the level of technology used in most of them is limited, resulting in low exploitation of animal population. Bringing in modern technology is an area that existing as well as new investors in the sector can focus on, this will make a clear difference in both process efficiencies as well as quality of the end product.
- **Increasing Penetration in Domestic Markets**
  Most of the processing units are export oriented and hence their penetration levels in the domestic market are low. For example:
  - Penetration of processed fruits and vegetables overall is at 10 per cent
  - The relative share of branded milk products especially ghee is still low at 2 per cent
  - Penetration of culinary products is still 13.3 per cent and is largely tilted towards metros
  - Consumption of packaged biscuits for Indian consumers is still low at 0.48 per cent while that for Americans is 4 per cent

  However, there is increasing acceptance of these products amongst the urban population. India has a large untapped customer base and even a small footprint in the domestic market would enable the player to gain significant volumes.
- **Competitive Pricing**
  Consumers of processed foods are extremely price sensitive. Even a small change in pricing can have significant impact on consumption. For instance, the launch of PET bottles, new price points and package sizes in non-carbonated drinks (such as by Coca Cola) increased in-home consumption from 30 per cent to 80 per cent in a year's time. Competitive pricing also enables penetration in the rural markets.
- **Brand Competitiveness**
  Share of branded products in purchases of Indian consumers has also increased substantially. This is especially true for urban consumers. Branded products like Basmati rice and KFC's chicken have been very successful implying that there is a good demand for hygienic branded products at reasonable prices.
- **Product Innovation**
  Certain processed food categories such as snack foods are impulse purchase products where consumers look for novelty and new flavours and hence these categories lack brand loyalties. Visibility through attractive packaging boosts consumption. Increasing time constraints amongst the working middle class has boosted consumption of products like instant soups, noodles and ready-to-make products. Innovation in packaging and product usage is an important success factor for processed foods.

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9. Challenges faced by Food Processing Industry in India

- **Informalization in Food Processing Industry:** The food processing industry has a high concentration of unorganised segments, representing almost 75% across all product categories. This causes the inefficiencies in the existing production system.
- **Lack of efficient supply chain infrastructure:** Inadequate expansion of processing and storage capacity commensurate with agriculture production have been identified as the main reasons for higher wastages, higher cost of production, lower value addition in food processing sector.
- **Lower Value addition**: India despite being one of the major producer of agri-commodities, the level of food processing and value addition continues to remain low affecting our competitiveness & export performance and income of farmers.
- **Significant gap in Cold Chain capacity** is one of the important reasons for higher wastage of agriculture produce particularly perishable segments. Cold Chain infrastructure involves heavy investment with long payback period which is beyond the capacity of individual food processors.
- **Inadequate linkage of processors, exporters and bulk purchasers with farmers**: Lack of coordination results in mismatch between the requirements of industry and supply of agri-produce by the farmers. This problem is often worsens if there are any legal provisions relating to restrictions on that commodity storage and movement.
- **Poor Credit Facility:** Food processing units, largely operating in MSME segment, face problem in their access to bank credit due to seasonal and perishable nature of the commodities handled by these units. High cost and inadequate credit do not attract prospective entrepreneurs choosing food processing sector for investment.
- **Bureaucratic hurdles:** Multiple clearances are required for setting up of food processing units. The small processors are also required to go through the same processes as is applicable to larger units. Availing permission for Change in Land Use (CLU), environmental clearance, water and power connections are not only time consuming but also costly.
- **Labour Laws**: Food processing units are required to comply with labour laws in relation to lay-off, retrenchment and closure even though these units run seasonally which adversely affects the commercial viability of the processing units.
- **Marketing of processed food:** It is a major problem faced by food processors particularly for the micro and small processors. Given the scale of operation, individual units are unable to invest in marketing and branding impacting performance of the sector.
- **Lack of awareness:** Processors face difficulty in availing benefits under schemes being implemented by different agencies of central and state governments in the absence of exclusive supportive forum at the state level. Lack of awareness and absence of appropriate knowledge sharing & guidance forum adds to their problem.
- **Inadequate training:** Sector specific Entrepreneurship Development training and Incubation Services are weak areas inhibiting growth of the sector.
- **Seasonality Of operations-** These industries do not operate the entire year due to seasonality of agriculture. But in developed countries, industries run all year round due to technological advancement which enables storage of produce.
- **Co-ordination in Research**: A number of research institutes are undertaking R&D for product, process, and technology improvement & development. There is a need for coordinated action on research and dissemination of research output to the industry.
- **Limited ability to control quality and safety:** The sheer number of players, especially in the large unorganized segment, involved in the food value-chain, makes implementation of quality and safety norms difficult. This has led to practices such as milk adulteration and use of carbide for fruit ripening becoming more widespread. Moreover, food testing, quality certification and safety issues are other weak areas which needs priority attention.

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10. Policy Initiatives and Measures Taken by the Government to Support the Food Processing Sector

In order to facilitate and harness the growth potential of this sector, the government has initiated extensive reforms.

- Most of the processed food items have been exempted from the purview of licensing under the Industries (Development and regulation) Act, 1951, except items reserved for small-scale sector and alcoholic beverages.
- Food processing industries were included in the list of priority sector for bank lending in 1999.
- Automatic approval for foreign equity up to 100 per cent is available for most of the processed food items except alcohol, beer and those reserved for small-scale sector subject to certain conditions.
- Full repatriation of profits and capital has been allowed.
- Zero duty import of capital goods and raw material for 100 per cent export oriented units.
- Full duty exemption on all imports for units in export processing zones has been done.
- In Union Budget 2017-18, the Government of India has set up a dairy processing infra fund worth Rs 8,000 crore (US$ 1.2 billion).
- The government **in Union Budget 2020** has increased allocation for Food Processing Sector to Rs. 1,232.94 crore for the next fiscal from the revised estimate of Rs. 1,042.79 crore.
- The Government of India has relaxed foreign direct investment (FDI) norms for the sector, allowing up to 100 per cent FDI in food product e-commerce through automatic route.
- **Food map of India** has been uploaded on the website of the ministry of FPI to indicate surplus and deficit areas. Further, **Investor's portal** has been launched by the ministry to promote investment in FPI to give information about potential areas.
- **APMC Reforms** have been brought for promotion of contract farming which subsequently will boost supply of raw materials to the FPIs.
- **Agriculture Export Zones** are being established since 2001. They will function similar to Special Economic Zones (SEZs) but only for agriculture products. 16 AEZs have been established with an objective to export agri-products. Tax rebates are more in AEZs as compared to in Mega Food Parks.
- The Food Safety and Standards Authority of India (FSSAI) is investing to strengthen the food testing infrastructure in India, by upgrading 59 existing food testing laboratories and setting up 62 new mobile testing labs across the country. FSSAI under the Ministry of Health and Family Welfare has issued the Food Safety and Standards (Food Product Standards and Food Additives) Regulations, 2011 and the Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011 which prescribe the quality and safety standards respectively for food products. Also, it has issued new rules for importing products, to address concerns over the entry of sub-standard items and simplify the process by setting shelf-life norms and relaxing labelling guidelines.
- The Indian Council for Fertilizer and Nutrient Research (ICFNR) has adopted international best practices for research in fertilizer sector, which will enable farmers to get good quality fertilizers at affordable rates and thereby achieve food security for the common man.

10.1 Schemes related to Food Processing Industries:

PM Kisan SAMPADA Yojana

It is a comprehensive package which will result in creation of modern infrastructure with efficient supply chain management from farm gate to retail outlet. It will not only provide a big boost to the growth of food processing sector in the country but also help in providing better returns to farmers and is a big step towards doubling of farmers income, creating huge employment opportunities especially in the rural areas, reducing wastage of agricultural

produce, increasing the processing level and enhancing the export of the processed foods.

Student Notes:

The following schemes will be implemented under PM Kisan SAMPADA Yojana:

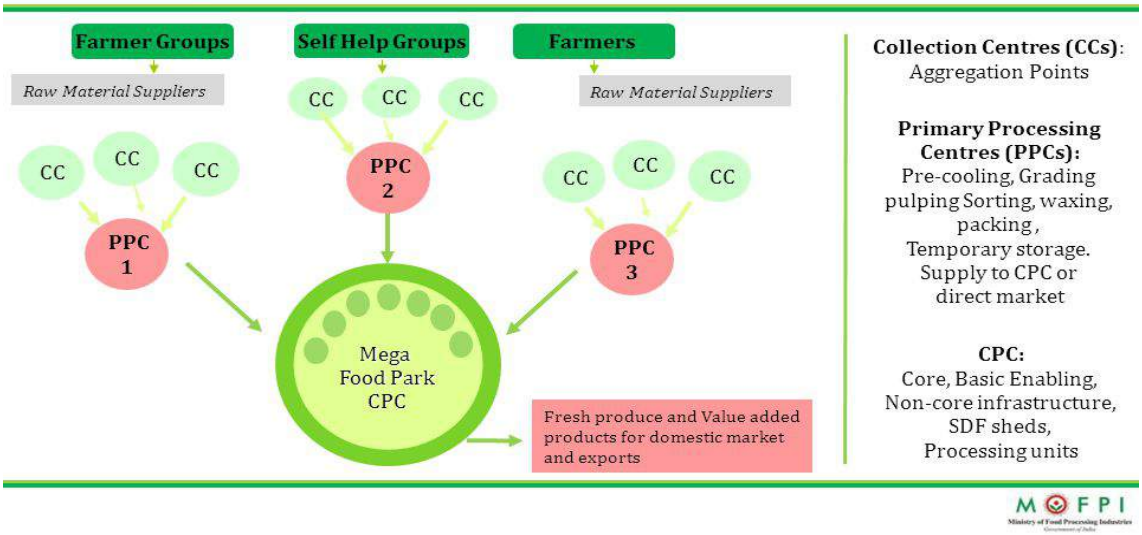
- Mega Food Parks
- Integrated Cold Chain and Value Addition Infrastructure
- Creation / Expansion of Food Processing & Preservation Capacities
- Infrastructure for Agro-processing Clusters
- Creation of Backward and Forward Linkages
- Food Safety and Quality Assurance Infrastructure
- Human Resources and Institutions
- Operation Greens

Operation Greens seeks to stabilize the supply of Tomato, Onion and Potato (TOP) crops and to ensure availability of TOP crops throughout the country round the year without price volatility.

Mega Food Park Scheme:

- Mega Food Parks Scheme was launched by the government in 2008. It provides financial assistance up to 50 crores to setup modern infrastructure facilities for food processing called Mega Food Parks. The primary objective of the Scheme is to provide modern infrastructure facilities for the food processing along the value chain from the farm to the market with a cluster based approach based on a hub and spokes model.
- **It has 3 layers:**
  - At the centre, there is **central processing centre (CPC)** which is 80-100 acres. From here the value-added product will either go to the domestic market or for exports.
  - Around CPC, there are **PPC (Primary Processing Centre)** where works like sorting, grading, pre-cooling, packaging etc. are done.
  - Around PPC, **CCs (Collection centres)** are there working as aggregation and storage centres which collect from farmers, middle-men, mandis etc.
- The Mega Food Park project is implemented by a Special Purpose Vehicle (SPV), which is a Body Corporate, registered under the Companies Act. The government has sanctioned 37 food parks funded under the Mega Food Parks Scheme, 20 are operational and 17 are under implementation as on 29th Oct 2020.

A Hub and Spoke Model



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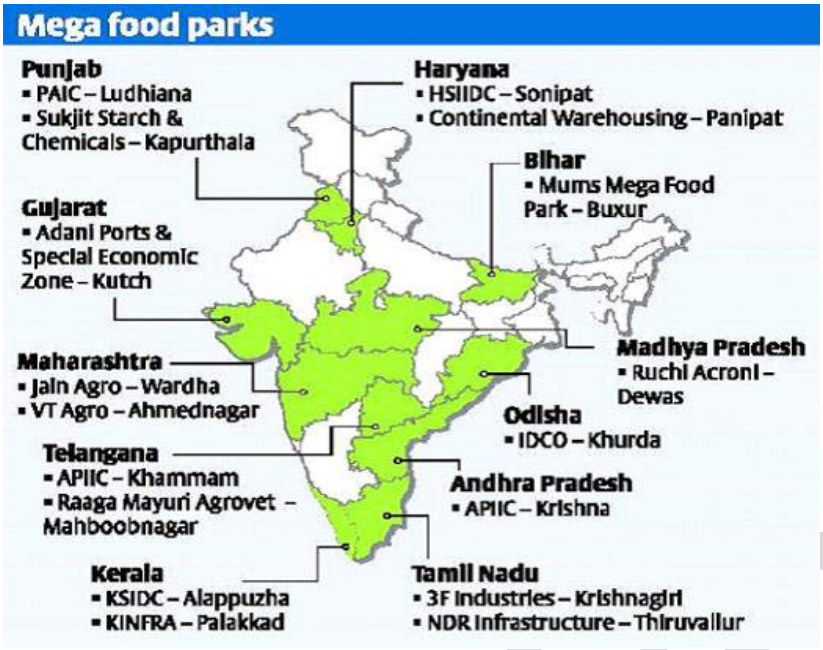


Scheme for formalization of Micro Food Processing Enterprises

The Union Cabinet has given its approval to a new Centrally Sponsored Scheme – "Scheme for Formalization of Micro food processing Enterprises" for the Unorganized Sector on All India basis. The Union Cabinet has sanctioned an outlay of Rs.10000 crore.

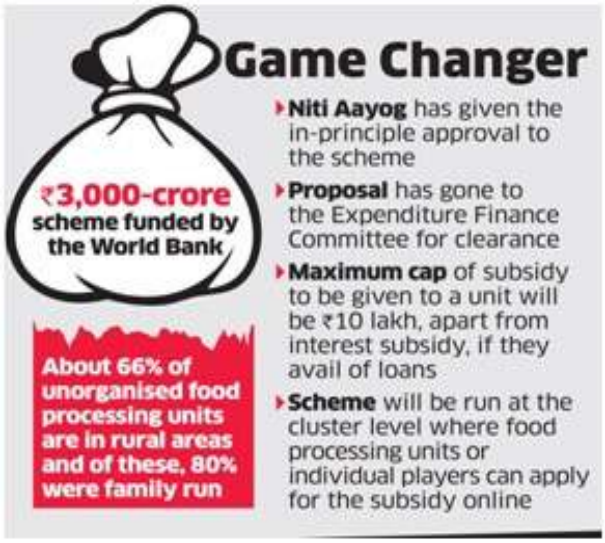
- **Features of the scheme**
  - Expenditure to be shared by the Government of India and States at 60:40.
  - 2 lakhs of micro-enterprises are to be assisted with credit linked subsidy.
  - The scheme will be implemented over a 5 year period from 2020-21 to 2024-25.
  - It will follow a cluster approach.
  - It will have special focus on perishables.
- **Support for Individual micro-units:**
  - Micro enterprises will get credit-linked subsidy @ 35% of the eligible project cost with a ceiling of Rs.10 lakh.
  - The beneficiary contribution will be a minimum of 10% and balance from the loan.
  - On-site skill training & Handholding for DPR and technical up-gradation.
- **Implementation strategy:**
  - Seed capital of Rs. 4 lakh per SHG will be given for the loan to members for working capital and small tools.
  - Grant will be provided to FPOs for backward/forward linkages, common infrastructure, packaging, marketing & branding.
- **Administrative and Implementation Mechanisms**
  - The Scheme would be monitored at Centre by an Inter-Ministerial Empowered Committee (IMEC) under the Chairmanship of Minister, FPI.
  - A State/ UT Level Committee (SLC) chaired by the Chief Secretary will monitor and sanction/ recommend proposals for expansion of micro-units and setting up of new units by the SHGs/ FPOs/ Cooperatives.
  - The States/ UTs will prepare Annual Action Plans covering various activities for implementation of the scheme, which will be approved by the Government of India.
  - A third-party evaluation and mid-term review mechanism would be built in the programme.
  - The State/ UT Government will notify a Nodal Department and Agency for implementation of the Scheme.

Student Notes:

- **Establishment of a National Portal & MIS**
  - A National level portal would be set-up wherein the applicants/ individual enterprise could apply to participate in the Scheme.
  - All the scheme activities would be undertaken on the National portal.
- **Benefits catered by the Scheme**
  - Nearly eight lakh micro-enterprises will benefit through access to information, better exposure and formalization.
  - Credit linked subsidy support and hand-holding will be extended to 2 lakh micro-enterprises for expansion and up-gradation.
  - It will enable them to formalize, grow and become competitive.
  - The project is likely to generate nine lakh skilled and semi-skilled jobs.
  - The scheme envisages increased access to credit by existing micro food processing entrepreneurs, women entrepreneurs and entrepreneurs in the Aspirational Districts.
  - Better integration with organized markets.
  - Increased access to common services like sorting, grading, processing, packaging, storage etc.

Gram Samriddhi Yojna:

- It aims to bolster the unorganised food processing sector concentrated in rural areas. About 66% of unorganised food processing units are in rural areas and of these, 80% were family run.
  The Rs. 3,000 crore scheme funded by the World Bank and the centre will help cottage industry, farmer producers' organisation and individual food processors to increase capacity, upgrade technology besides skill improvement, entrepreneurship development and strengthening the farm-to market supply chain.



Draft National Food Processing Policy -2019:

The Ministry of Food Processing Industries released the Draft National Food Processing Policy, 2019 for public comments. It aims for the development of the food processing sector and addressing the critical gaps hampering its growth.

Strategy as suggested by the Policy includes

- Promotion **of cluster approach** with emphasis on strengthening and creation of integrated supply chain infrastructure to minimize wastages,
- Incentivizing **expansion of capacity and upgradation** of technology for processing and preservation particularly for perishables,
- Increasing **access to institutional credit,**
- **Promoting employment by incentivizing,**
- **Supporting Research & Development activities,**
- **Strengthening of institution operating in food processing** segment for advancement of learning, dissemination of knowledge, entrepreneurship and skill training to meet the growing demand of the sector;
- Creating **awareness on food quality & safety**,
- Training manpower for ensuring regulatory compliance,

Student Notes:

- A**ccelerating investment in food processing** sector through collaboration with all stake holders;
- E**ncouraging separate single window clearance desk** at Department of Food Processing at the state level to handle all matters related to food processing etc.

Scheme for Cold Chain, Value Addition and Preservation Infrastructure:

The objective of the scheme is to facilitate creation of integrated cold chain and preservation infrastructure facilities without any break from farm to consumer. It intends to address the shortage of cold storage capacity. The scheme mentions three types of facilities to be created such as:

- Minimal processing centre at the farm gate level having facilities like weighing, sorting, grading, pre-cooling, CA/MA storage, IQF and normal storage facilities
- Mobile pre- cooling vans and reefer trucks
- Distribution hubs having facilities such as multi-purpose cold stores, variable humidity stores, Quick Freezing and blast freezing etc.

Modernization of Abattoirs:

The objective is modernize existing abattoirs or establish modern abattoirs promoting scientific and hygienic slaughtering, application of modern technology for waste management, better by product utilization, provision of chilling facility, retail cold chain management etc. under PPP mode with the involvement of local bodies (panchayats or municipalities) on build-own-operate/build-operate-transfer (BOT)/Joint venture(JV) basis.

Make In India:

As part of the Make in India campaign, food processing sector was identified as one of the 25 focus areas. Also, under Make in India campaign, 31 **Sector Skill Councils (SSCs**) were established by the government along with FICCI of which 1 is for FPI.

TRIFOOD Project:

Ministry of Tribal Affairs, Ministry of FPI along with TRIFED have initiated the project with aim to enhance the income of tribals through better utilization of and value addition to the Minor Forest Produce (MFP) collected by the tribal forest gatherers.

Food Processing Fund:

A special fund in the NABARD worth INR 2,000 crore, designated as the Food Processing Fund, was set up in the FY 2014-15 for providing affordable credit to food processing units in Mega & Designated Food Parks.

One District One Product (ODOP):

The scheme was launched by the Government of Uttar Pradesh to encourage and revive aboriginals' arts and craft products. It would help Micro, Small and Medium Enterprises (MSMEs) to produce and promote products that are unique in Uttar Pradesh. The programme aims to encourage more visibility and sale of indigenous and specialized products/crafts of Uttar Pradesh, generating employment at the district level.

The main objectives of the One District One Product Programme are as follows:

- Preservation and development of local crafts/skills and promotion of the art.
- Increase in the incomes and local employment (resulting in a decline in migration for employment).
- Improvement in product quality and skill development.
- Transforming the products in an artistic way (through packaging, branding).
- To connect the production with tourism (Live demo and sales outlet – gifts and souvenir).

- To resolve the issues of economic difference and regional imbalance.
- To take the concept of ODOP to national and international level after successful implementation at the State level.

Under this project, one particular product is selected from every district of Uttar Pradesh. The selected product under ODOP needs to be traditionally famous for its production and manufacturing from that particular district. For instance: Lucknow is famous for zari-zardozi and chikankari. Many of these products are GI-tagged, which means they are certified as being specific to that region in Uttar Pradesh.

The manufacturing process of a lot of these products are also dying community traditions that are being revived through modernization and publicization. Under the ODOP programme, artisans, production units and associations which are related to the selected products are promoted by lending loan, establishing Common Facility Centers, providing marketing assistance so these products can be popularized and employment can be generated at the district level.

Sub-schemes under the ODOP are:

- Common Facility Centre Scheme
- Marketing Development Assistance Scheme
- Finance Assistance Scheme (Margin Money Scheme)
- Skill Development Scheme.

Important Institutes related to technology improvement and R & D in Food Processing Sector are as follows:

NIFTEM	National Institute of Food Technology Entrepreneurship and Management (NIFTEM) was conceptualized by Government of India on persistent demand of the food industry to have an apex body as a **"One Stop Solution Provider"** for the various problems of the sector. Ministry of Food Processing Industries, Government of India has set up this institute with an initial investment of Rs. 500 crore (US $100 million).
CIPHET	The ICAR-Central Institute of Post-Harvest Engineering and Technology (CIPHET) was established on 3rd October 1989 at the PAU Campus, Ludhiana, Punjab, India as a nodal institute to undertake lead researches in the area of the Post-Harvest Engineering and Technology appropriate to agricultural production catchment and agro-industries.
IIFPT	The Indian Institute of Food Processing Technology (IIFPT) is a pioneer Research and Educational Institution under the Ministry of Food Processing Industries, Government of India
ICAR	Runs different All India Co-Ordinated Research for developing varieties which can be used for processing

10.2. Challenges that still remain despite Government Initiatives

The challenges for the food processing sector are diverse and demanding, and need to be addressed on several fronts to derive maximum market benefits. A combination of uncontrollable and controllable factors has affected the growth of the sector and has acted as a hindrance in achieving its potential.

The **uncontrollable factors** which are difficult to address and hence have to be discounted for while accounting for the inadequate growth of the sector. It include fragmentation of land holdings which has resulted in lack of scale and has made investments in automation unviable; regional climatic variations which impact the production; and the constraints in land availability due to competing pressure from urbanization, constructions and industrialization.

C**ontrollable factors** which can be addressed by intervention of Government and private enterprises. It includes issues of quality and quantity of raw produce, low labor productivity with slow adoption of technology. On the Infrastructure front, we have supply chain and wastage related problems and low levels of value addition etc. The other issues of concern, holding this sector back are impaired access to credit; inconsistency in state and central polices, which requires both the Center and the State to work as one single cohesive unit.

Student Notes:

Indian food-processing industry is poised for explosive growth driven by changing demographics, growing population and rapid urbanization along with increased government support. These factors will increase the demand for value added products and thus improve the prospects of food-processing industry in India.

The government's focus towards food processing industry as a priority sector will ensure policies to support investment in this sector and attract more FDI. India with its vast pool of natural resources and growing technical knowledge base has strong comparative advantages over other nations. According to CII estimates, food-processing sector has the potential of attracting US $33 billion of investment in 10 years and generate employment of 9 million person-days. The food processing sector in India is clearly an attractive sector for investment and offers significant growth potential to investors.

10.3. Suggestions and Way Forward

The need of the hour is to adopt an integrated approach to address the above mentioned tailbacks with a clear-cut focus on improving the quality and value of the output, reducing the cost of raw material for the processors, while improving the farmers' income levels.

To promote this sector, attempts are required to be made to promote farmer–producer interaction, provide appropriate tax incentives and holidays for setting up food processing industries, taking care of expenses on market promotion and ancillary activities.

Policy initiatives to plug supply side and infrastructure bottlenecks

- Foster development of backward linkages by evolving conducive regulatory framework for contract and corporate farming
- The North Eastern Region, the Hilly States (J&K, HP and Western UP), the Islands (A&N, Lakshadweep) areas in the country should be given special consideration as they are naturally conducive for FPIs. In this direction, **Zoram Mega Food Park**, Mizoram's 1st such park was set up by MoFPI.
- Encourage commodity clusters and intensive livestock rearing.
- Promote private sector participation with well-defined roles of the participants, risk sharing mechanisms, fiscal incentives and partnership models for creation of infrastructure for logistics, storage and processing.
- Encourage technology up gradation of existing facilities and investment in development of ancillary industries like research and development, packaging, food processing equipment manufacturing, food safety certifying agencies by extending fiscal incentives to investors.
- Enable better access to credit by augmenting current cap of Rs 10 crore investments in plant and machinery to qualify as Priority Sector Credit to accommodate the high cost technology adoption and scale enhancement.

Streamlining the regulatory structure

- Remove impediments of multiple departments and laws in seeking approvals by bringing them under a single window.
- Ensure uniform implementation of the APMC act to encourage private sector investment in infrastructure development.

Change in mindset - Orienting stakeholders towards 'demand and profit driven production'

- Participants across the agri value- chain need to shift their focus from trying to market 'what is produced' to producing 'processable varieties and marketable products' meeting global quality standards and traceability requirements, duly adopting need based viable technologies and quality controls.

Human resource development-to meet increasing demand for skilled manpower

- Stimulate industry, academia and government to put in combined efforts for development of specialized institutes and courses for providing training on managerial, safety and enforcements, technology and production, warehousing and distribution aspects.
- Encourage State Agricultural Universities to commence courses in food packaging, processing, bio-technology, information technology in agriculture and such allied fields.

11. A Brief SWOT Analysis of the Food Processing Industry in India

Strengths	Weaknesses	Opportunities	Threats
Round the year availability of raw materials. Social acceptability of food-processing as an important area and support from the central government. Vast network of manufacturing facilities all over the country. Vast domestic market.	High requirement of working capital. Low availability of new, reliable and better accuracy instruments and equipments Inadequate automation w.r.t. information management. Remuneration is less attractive for talent in comparison to contemporary disciplines. Inadequately developed linkages between R&D labs and industry.	Large crop and material base in the country due to agro-ecological variability offers vast potential for food processing activities. Integration of developments in contemporary technologies such as electronics, material science, computer, bio-technology etc. offer vast scope for rapid improvement and progress. Opening of global markets may lead to export of our developed technologies and facilitate generation of additional income and employment opportunities.	Competition from global players Loss of trained manpower to other industries and other professions due to better working conditions prevailing there may lead to further shortage of manpower. Rapid developments in contemporary and requirements of the industry may lead to fast obsolescence.

12. Previous Year UPSC Mains Questions

1. Explain Mega Food Park Scheme of Government, of India. 15 marks (2007)
2. India needs to strengthen measures to promote the pink revolution in food industry for ensuring better nutrition and health. Critically elucidate the statement. 10 marks (2013)
3. What are the impediments in marketing and supply chain management in developing the food processing industry in India? Can e-commerce help in overcoming this bottleneck? 12.5 marks (2015)
4. What are the reasons for poor acceptance of cost effective small processing unit? How the food processing unit will be helpful to uplift the socio-economic status of poor farmers? 10 marks (2017)
5. Examine the role of supermarkets in supply chain management of fruits, vegetables and food items. How do they eliminate number of intermediaries? 10 marks (2018)
6. Discuss the factors for localization of agro-based food processing industries of North-West India. 10 marks (2019)
7. Elaborate the policy taken by the government of India to meet the challenges of the food processing sector. 15 marks (2019)

Student Notes:

13. Previous Year Vision IAS GS Mains Test Series Questions

1. "Despite continuous efforts and initiatives of the Government to provide the required stimulus to the food processing sector, processing activity is still at a nascent stage in India with low penetration". In the above context, examine the challenges ailing the food processing sector in India.

Approach:

- First give some facts about food processing activities in India and government initiatives.
- Then bring forward the challenges faced by this industry in India.

Answer:

India is one of the world's largest producers as well as consumer of food products. In order to facilitate and exploit the growth potential of the sector, the government on its part has initiated extensive reforms. Some of the key measures: amendment of the Agriculture Produce Marketing Committee Act, rationalization of food laws, implementation of the National Horticulture mission etc. The government has also outlined a plan to address the low scale of processing activity in the country by setting up the mega food parks, with integrated facilities for procurement, processing, storage and transport. 100% FDI in the food processing & cold chain infrastructure is also allowed.

However, despite of continual efforts and initiatives of the Government to provide the required stimulus to the sector, processing activity is still at a nascent stage in India with low penetration. In terms of development of the country's total agriculture and food produce, only 2 % is processed.

Following are the major factors hampering the growth of food processing sector:

- **Inadequate Infrastructure Facilities** is the biggest bottleneck in expanding the food processing sector: long and fragmented supply chain, inadequate cold storage and warehousing facilities, rail, road and port infrastructure. Also, lack of modern logistics infrastructure such as logistics parks, integrated cold chain solutions, last mile connectivity, dependence on road over rail, customized transportation, technology adoption (barcoding, RFIDs) and government support via incentivizing private public partnerships are some of the lacunae that exist in supply chain & logistics sector in India.
- **Absence of Comprehensive national level policy on food processing sector:** The food processing sector is governed by statues rather than a single comprehensive policy on food processing.
- **Food Safety Laws & Inconsistency in State and Central policies:** Though historically various laws were introduced to complement and supplement each other in achieving total food sufficiency, safety and quality the result is that the food sector in India is governed by a number of different statutes rather than a single comprehensive enactment.
- **Lack of adequate trained manpower:** Many positive developments in the food processing sector have also resulted in the apprehension about the emerging skill shortages due to mismatch between the demand for specific skills and available supply.
- **Uncontrollable and controllable factors which affected the growth of the sector:** The uncontrollable factors include fragmentation of land holdings which has resulted in lack of scale and has made investments in automation unviable, regional

climatic variations which impact the production and constraints in land availability due to competing pressure from urbanisation, constructions and industrialization. While, controllable factors includes issues of quality of raw materials, low labour productivity, with slow adoption of technology etc.

Apart from the above major challenges hampering the growth of sector, the other identified constraints are in raw material production, taxation, access to credit, processing plants with obsolete technologies, lack of applied research etc.

2. Explain the backward and forward linkages across the supply chain in the Food Processing Sector. Also discuss their importance in ensuring the success of Supply Chain Management in the Food Processing Industry of India.

Approach:

Students should focus on explaining the meaning of backward and forward linkages. Any examples given should add to the weight of the answer. Additionally, the second part should focus on how FPI in India lacks in proper backward and forward linkages and improvement in this aspect would lead to overall growth of the FPI in India.

Answer:

- Forward and backward linkages mean the connectivity of the Food Processing Industry with the market and source of raw materials respectively.
- One important linkage falling under the backward linkages is the raw material linkage to the extent the FPI procures the raw material from the agro sector of the country. Other important backward linkages include the demand for the capital goods and machinery used in production, packing of the finished material.
- Some of the products of forward linkages are directly consumed by the people whereas some products may be used as input in other industries for production of more refined agro based products.
- For example, if one makes jams on a small scale, his backward linkage is the infrastructure, which connects him with his source of raw fruits, and his forward linkage is the infrastructure which connects him with the market
- The backward linkages of the production process involves searching for and extracting raw materials. This part of the production process does not do anything with the material itself, such as processing the material. This part of the process simply finds and extracts the raw material. Thus, any industry that relies on the extraction of raw materials commonly has an upstream stage in its production process.
- The forward linkage in the production process involves processing the materials collected into a finished product. The forward linkages further includes the actual sale of that product to other businesses, governments or private individuals. Forward linkages have direct contact with customers through the finished product.

Importance of forward and backward linkages

- The extent to which the FPI will generate the needed impetus for the overall industrial development of the state will depend upon their various linkage effects.
- Companies in the processed food manufacturing space face problems on the inbound supply chain side in terms of inconsistency of inputs quality, high level of wastages as the product reaches the manufacturing base and unwanted cost additions with minimal value additions.
- This is due to the long and fragmented supply chain which results in these wastages and price escalations. This generates requirement for companies to invest in

Student Notes:

creating **backward linkages** through contract farming, which would enable the company to control the inputs at an assured quality level with minimal wastages.

- Both backward and forward linkages are important for the uninterrupted temperature and climate controlled agricultural supply chain from the farm gate to the market. Majority of the processed foods require controlled temperature at the point of sale.
- Coming of food processing industries with strong forward and backward linkages will push farmers to cultivate crops as per the demand in market. With other benefits, this will cut our heavy import of oilseeds and pulses.
- As per some estimates, strengthening of backward and forward linkages will help in controlling the food wastage, which is estimated at over Rs 40,000 crore, and also aids in curbing inflation.

3. Food processing industry needs a fillip in the form of better logistics, access to credit, technology indigenisation and implementation of food safety laws. Discuss.

Approach:

- Briefly introduce the potential of food processing industry in India.
- Explain the need for the development of better logistics, access to credit, technology indigenisation and implementation of food safety laws in order to exploit the complete potential of food processing industry.
- The given issues can be discussed under separate headings along with the suggestions.

Answer:

Food and food products are the biggest consumption category in India, with spending on food accounting for nearly 21% of India's GDP. But the overall processing level is just 10% in India whereas it has reached nearly 80% in some developed countries. Its share in exports of processed food in world trade is just 1.5%.

Some of the major constraints to food processing industry are: inadequate logistics, access to credit, technology indigenisation and implementation of food safety laws.

Need for better logistics

- The national highways are highly strained by low capacity and high traffic volumes, leading to delays in transit.
- Rail freight network suffers due to lack of last mile connectivity, inefficiency, low availability of wagons, lack of private participation etc.
- The dependence on manual labour and low technology usage affects turnaround times at ports, including cost.
- There is an urgent need to develop dedicated freight corridors in rail, supplemented by concretised dual carriageways for the State and national highways.
- There is a need to support development of organised strategic logistics hubs and incentivise operators in setting up end-to-end logistics and warehousing.

Access to credit

- The Government should establish a national bank, on the lines of NABARD, or extend the scope of NABARD, to lend credit to food processing industries.
- This will ensure speedy disbursal of funds to the food processing sector, which is always grappling with the issue of lack of access to credit from banks.
- State governments should play a catalytic role in partnership with banks, financial institutions, technical and management institutions and farmers' groups, so that small and unorganised players become globally competitive.

Student Notes:

Technology Indigenisation

- Most R&D institutions have not been able to develop innovative products, processes and machinery of a global stature. The key reasons for this are segregation of academics from applied research, inadequate industry interface, low commercial orientation and lack of collaborative efforts with global peers.
- Technology is still being imported for the establishment of large-scale, exported-oriented units for production of items such as even banana paste, concentrates of various fruit juices, sorting, cleaning, washing, waxing and packaging of raw fruits and vegetables.
- In order to achieve global standards and self-sufficiency there is an urgent need for technology indigenisation in food processing industry.

Implementation of Food Safety Laws

- The Government should ensure enforcement of the Food Safety and Standards Act (FSSA) in spirit, including increasing radically the number of trained inspectors and state-of-the-art lab facilities.
- Given the objective of the FSSA and the mandated transparency, it is important that: food authorities, scientific panels and scientific committees must be given defined tasks with specified objective of rule-making; public and industry participation at an early date.
- In order to increase the exports of processed foods, there is a need for enforcing strict safety standards as per the global requirements. There have been many incidents of rejection of Indian food products due to safety concerns.

The National Mission on Food Processing is an important initiative of the government, which aims to overcome the above constraints and reap the potential of food processing sector in India.

4. Despite numerous schemes and programmes the growth of food processing industry has been very slow in India. In this context examine the problems with respect to various government initiatives to boost the food processing sector in India.

Approach:

- Briefly mention the growth attained by the food processing sector.
- Mention few of the government schemes in this regard.
- Explain how it is yet performing below its potential.
- Bring out the factors that have led to limited success of these schemes.

Answer:

Accounting for about 32% of India's total food market, the Food Processing Industry (FPI) is ranked 5th in terms of consumption, export and expected growth. Government has taken following initiatives for the growth of the sector:

- Till 2005, there were about 13 laws regarding FPI. Government passed Food Safety and Standard Act, 2006 to act as a single reference point for regulation.
- Government has allowed 100% FDI in industry.
- Infrastructure Facilities: Mega Food Parks, Packaging centers, Integrated clod chain facility, Value Added Centre, Irradiation Facilities, Modernization of Abattoir
- National Mission on Food Processing for all round development of industry.
- Reforms in APMC Act and rationalization of Food Laws.

Student Notes:

Because, of these efforts by the government, the industry is growing at a satisfactory rate. However, it's still well below the potential as the processing activity is still at a nascent stage with low penetration.

Government schemes have not been adequately able to address the following problems that arise due to inadequacy and poor implementation of reforms.

- The inadequate support infrastructure is the biggest bottleneck in expanding the sector, in terms of both investment and exports. Long and fragmented supply chain, inadequate cold storage and warehousing facilities, road, rail and port infrastructure, lack of modern logistics infrastructure such as logistics parks, integrated cold chain solutions, last mile connectivity, dependence on road over rail, customized transportation, technology adoption (barcoding, RFIDs) are still not addressed.
- Inconsistency in State and Central policies. In a survey done by FICCI, absence of comprehensive national level policy on food processing sector has been identified as the second most critical factor hampering Industry's growth.
- Shortage of skilled, semi-skilled and unskilled workers has harmed the competitiveness sector.
- Declining support to R&D.
- Constraints in raw material availability because of inconsistent and insufficient supply of raw material due to seasonality of crops, poor quality of raw material supply and high losses during transport from farm to factory.
- Lack of enthusiastic private sector participation in important schemes like Mega Food Parks which still prefers to outsource and as a result about 50% processed food sold by FMCGs in India is outsourced.
- Still credit is a big problem to the industry which includes farmers and micro and small enterprises on a large scale.
- Failure to integrate land holdings and promote contract farming, which are key to the success of industry.

5. Discuss the potential of Food Processing Industry with regards to employment generation in India. What are the key impediments which need to be overcome before the sector can become internationally competitive and achieve high growth?

Approach:

- Discuss the opportunities that the Food Processing Industry can offer for raising employment.
- Key impediments that the industry is facing.
- How can it become internationally competitive and achieve high growth.

Answer:

Potential of Food Processing industry for employment generation

- The industry involves gamut of activites involved in reaching the final product to the consumer, starting with farm activity to supply chain.
- 42 mega food parks being set up with an allocated investment of INR 98 Billion.
- The cost of skilled manpower is relatively low as compared to other countries.
- Food Processing Industry is one of the major employment intensive segments contributing 13.04% of employment generated in all Registered Factory sector in 2012-13.

Student Notes:

- Food is the biggest expense for an urban and rural Indian household constituting share of 38.5% and 48.6% of the total consumption expenditure of households in 2011-12 respectively.
- Favourable economic & cultural transformation, shift in attitudes & lifestyles, consumers are experimenting with different cuisines, tastes and new brands. There is an increase in awareness and concern for wellness and health, high protein, low fat, wholegrain and organic food.

Impediments faced by Food Processing industry

- Fragmentation of land holdings which has made investments in automation unviable;
- Regional climatic variations which impact the production ; and the constraints in land availability due to competing pressure from urbanization.
- Slow adoption of technology, waste related problems, low levels of value addition.
- High requirement for working capital.
- Low availability of new, reliable and better accuracy instruments and equipments.
- Inadequate automation w.r.t. information management.
- Remuneration is less attractive for talent in comparison to contemporary disciplines.
- Inadequately developed linkages between R&D labs and industry.

Food Processing industry can reach its potential with both Government and Private Sector initiative. The industry can create millions of jobs, ensure food security and reduce wastage.

6. Food safety laws are a critical factor hampering the growth of food processing industry in India. Analyse.

Approach:

- Highlight the issues with the Food Safety Laws and rules.
- Discuss how it has negatively impacted the industry.
- Suggest some remedial measures.

Answer:

In 2006, Food Safety and Standards Act (FSSA) was passed with twin objectives of introducing a single statutory body relating to food and providing for a scientific development of food processing industry. It replaced multiple laws existing for the sector. However, a recent survey by FICCI has identified implementation bottlenecks in food safety laws as the third critical area of concern for food processing sector.

Some of the important limitations are:

- Slack implementation of Act.
- Ill trained and understaffed FSSAI personnel.
- Majority of laboratories in India do not have accreditation, and only few laboratories are fully equipped to cater domestic and export regulatory testing needs of food industry.
- Act extends its jurisdiction to all persons by whom food business is carried or owned under the definition of Food Business Operators, which is a huge base to cover.
- Onus of contamination lies with the manufacturer. However, most of the times they don't have control over raw food which is bought from outside and may be contaminated.

Student Notes:

As a result, checks are not done or done with much delay and red tape. The regulations have resulted in arbitrary rulings, discouraging industry investors. Lack of uniform and accurate food security apparatus in place puts industry in the line of litigations. The recent controversy related to standards in Maggi and different results from different labs for the same product does not augur well for the industry.

Hence, the need of the hour is to strengthen the implementation of the Act and ensure:

- Manpower development and up gradation of laboratories in terms of infrastructure and sophisticated equipment.
- Setting up of state-of-the-art advanced centers of excellence to undertake analytical research work to cater to requirements of industries, policy makers, regulators and consumers.
- Residue-monitoring plans for determining presence of toxic contaminants.
- Collaborative effort between Centre, states and private sector along with effective consumer awareness.
- Encouraging contract farming so that industry can maintain its own raw material standards without blame shifting.

All this will help in attaining global standards in food safety and make the sector an attractive destination for entrepreneurs.

7. Discuss the significance of food processing industry in the economic development of the country and the challenges which need to be tackled for sustained growth of the industry. Also elaborate on the salient features of National Mission on Food Processing.

Approach:

- Discuss the significance and the underlying challenges related to food processing industry in India.
- Mention the highlights of the NMFP.

Answer:

The Food Processing Industry (FPI) in India is significant due to abundance of food production, presence of diverse agro-climatic regions, large proportion of manpower engaged in agriculture, low cost of processing, labour intensive nature and Its potential to boost exports.

At the same time Government's initiative to make India a Global Food Factory and Global Food Market brings immense opportunities for food processing sector. Other factors include:

- It contributes around 14 per cent of manufacturing GDP, 13 per cent of India's exports and six per cent of total industrial investment. It is a sunrise industry, with double-digit growth rate globally. It has more than 10% growth rate in India.
- A developed FPI can help in achieving favourable terms of trade for Indian agriculture both in the domestic and international markets.
- Enhance nation's food security.
- It will help farmers get better prices for their produce, thus improving their income levels. It will stabilise prices by creating an assured demand for agricultural produce. It will also eliminate undue advantage currently accruing to middlemen at the cost of farmer's remuneration.
- It will lead to efficient utilization of food resources of the country. India witnesses nearly 4-18% wastage in fruits and vegetables annually, due to lack of modern

harvesting technologies and cold chain infrastructure. The wastage levels in other perishables are also significantly high.
- It will help develop vital linkages between the two pillars of our economy- industry and agriculture.
- Huge potential for skilled and semi skilled employment generation.

However the sector faces a number of **challenges**:

- **Supply side bottlenecks:**
  - Small and dispersed marketable surplus due to fragmented holdings
  - Low farm productivity
  - Low level of linkage between the industry and the farmers for the raw materials
  - High seasonality
  - Indian agriculture focuses on traditional crops rather commercial crops desired by the market
- **Infrastructure bottlenecks:**
  - Inadequate cold chain infrastructure and inadequate logistics
- **Deficiencies in the regulatory environment:**
  - Multiplicity of laws and rules which leads to contradictions and delays
  - Absence of a comprehensive National Policy on food processing for a long time
  - Delays in Commissioning of Food Processing Projects, obtaining Licenses/ Statutory Clearances, pending reforms in APMC act by State governments etc.
- Low **Research & Development**

The National Mission on Food Processing

"National Mission on Food Processing" was launched during the 12th five year plan to cater the different aspects of food processing industry viz. modernization of food processing industries, establishing of mega food parks, integrated cold chains and preservation and modernization of abattoirs. It addresses both institutional and infrastructural gaps along the value chains. It also has provision for promoting skill development, training and entrepreneurship in post-harvest management. Broadly, it aims to:

- enhance the capacity of food processing through new technologies
- improve the quality of food products as per international standards
- reduce wastage of agricultural produce
- infuse new technologies
- upgrade human resource capacities

Recently, the Government of India has provided flexibility to state governments to set their own physical targets and identify focus areas to harness the potential of value addition by using locally grown raw material.

8. To harness the full potential of the food sector, the Ministry of Food Processing Industries has launched various schemes in the last few years. Mention some of them and evaluate how successfully they have been able to create modern infrastructure to facilitate food processing and cold chain systems.

Approach:

Straight forward question. Mention and evaluate the schemes launched by the Ministry of Food Processing Industries to modernize the infrastructure in the food processing sector.

Answer:

Student Notes:

To harness the full potential of the food sector, the Ministry of Food Processing Industries has launched various schemes over the last few years. The focus of these schemes has been on creation of modern infrastructure to facilitate growth of food processing and cold chain system for handling perishable produce. More specifically, these schemes relate to the setting up of mega food parks; integrated cold chains, value addition and preservation infrastructure; and modernization of abattoirs.

- **Mega Food Parks Scheme**

The Mega Food Parks Scheme (MFPS), a flagship programme in the food processing sector, facilitates establishment of a strong infrastructure backed by an efficient supply chain. The Mega Food Parks have farm proximate facilities such as primary processing centers, collection centers and a central processing center. The food processing units within a Mega Food Park use common infrastructure required for processing, packaging, quality control labs, trade facilitation center etc. This cluster approach makes food processing more economically viable. The state-of-the art processing infrastructure gives them the required technical edge. Mega Food parks have the potential to revive the agriculture in the surrounding areas by increasing returns for farmers, besides creating large employment opportunities in rural areas.

- **Scheme for Cold Chain, Value Addition and Preservation Infrastructure**

The objective of the scheme is to facilitate creation of integrated cold chain and preservation infrastructure facilities without any break from farm to consumer. It intends to address the shortage of cold storage capacity.

- **Modernization of Abattoirs**

The objective is modernize existing abattoirs or establish modern abattoirs promoting scientific and hygienic slaughtering, application of modern technology for waste management, better by product utilization, provision of chilling facility, retail cold chain management etc.

These three schemes, which were launched with the objectives of value addition and reduction in wastages in the 11th FYP are in different stages of implementation. They are expected to lead to substantive value addition, reduction in wastage and enhancement in farmer's income. They also envisage taking due care of smaller states and left out regions. However their achievement in the long run depends upon a number of actions that are required to be performed by various other departments/agencies.

A number of other initiatives, like the Food Safety and Standard Act 2006, FDI in food processing sector, Schemes for Technology Upgradation/Establishment/Modernization of Food processing Industries, Quality Assurance, Codex Standards and R&D and Development and Promotional Activities and sector specific schemes, among others have also been launched in the past few years. The food processing sector has responded well to these and other schemes. The average growth doubled from 7% in 2004 to 14% in 2010. The Vision 2015 Document has set the goal of tripling the size of the processed food sector. Apart from the schemes that are already under operation in the sector, some more are in the pipeline. These schemes, coupled with other flagship programmes in agriculture and allied sectors, are expected to change the face of rural India and add prosperity to the life of the common man.

Student Notes:

9. What are Mega Food Parks? Explain the 'Hub and Spoke' model associated with it.

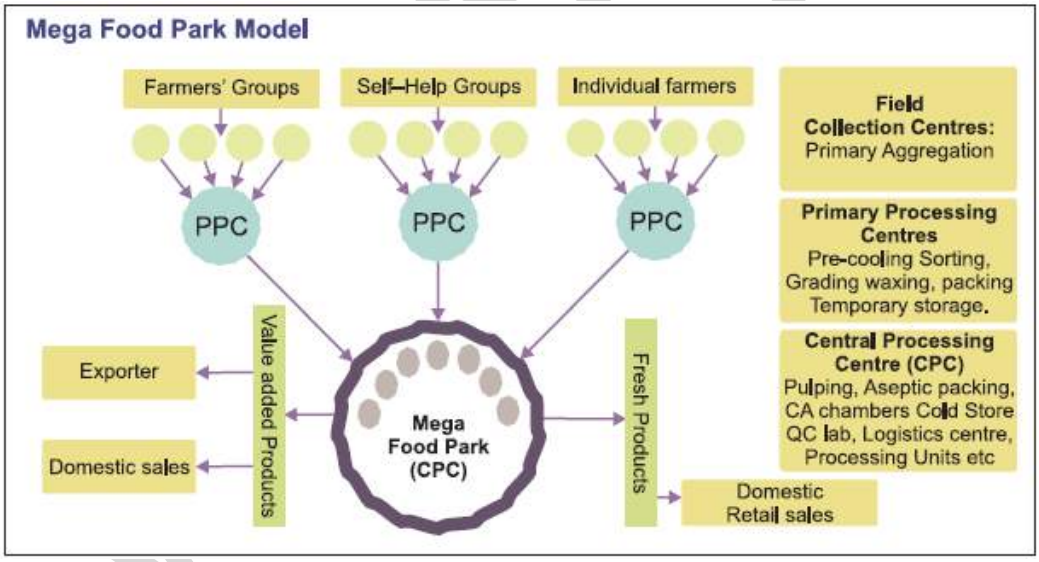
Approach:

Write down what are Mega Food Parks and how they will be established using Hub and Spoke model.

Answer:

The primary objective of Mega Food Parks Scheme (MFPS) is to provide excellent infrastructure for food processing sector along the value chain, especially for perishables like fruits and vegetables. This is aimed at making food processing economically more viable and generate large employment opportunities, particularly in rural areas. The Scheme is designed to bring farmers, processors and retailers (market) together so as to ensure maximization of value addition, minimize wastages and improve farmers' income.

The Scheme envisages a cluster-based approach and "Hub and Spoke" Model comprising farm proximate facilities such as Collection Centres, Primary Processing Centers (PPC) and a Central Processing Centre (CPC). The food processing units are to be located at CPC with need based Core Processing facilities (modern storage, processing, packaging, safety standards etc.) and Basic Enabling Infrastructure (captive power plant, effluent treatment facilities etc.). However, as the Mega Food Parks are demand driven and are based on cluster approach, the size, structure and facilities within the Parks may vary depending on region, product-mix and overall business plan of the promoters.



10. What is the role of forward and backward integration in ensuring success of Supply Chain Management in the Indian Food Processing industry?

Approach:

First explain what is forward (FWD) linkage and backward (BWD) linkage w.r.t. supply chain in Indian Food Processing industry. Illustrate how an efficient FWD and BWD linkages are necessary for an effective supply chain management.

Answer:

The success of Food processing industry depends on an efficient supply management system which tries to optimize supply chain system by getting right things to right place at right time in a cost effective manner. To achieve these efficiencies the role of forward

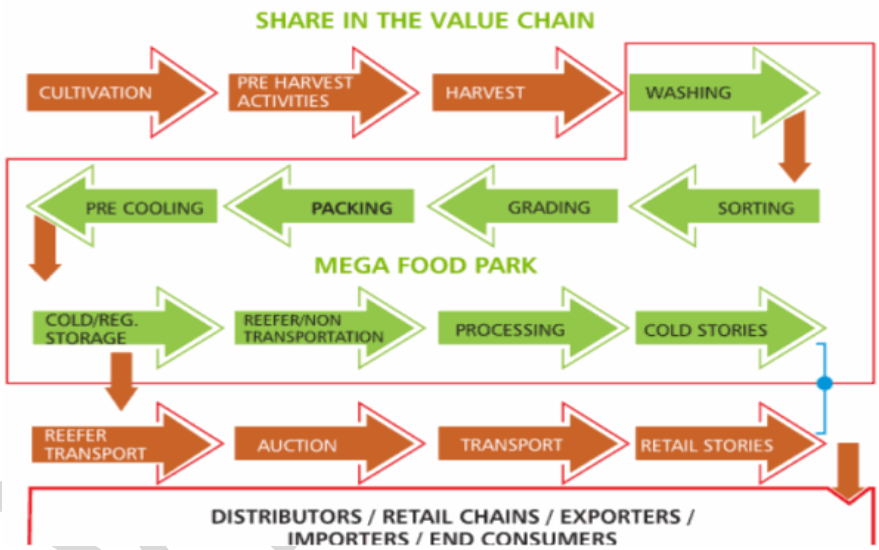
Student Notes:

and backward integration is most important. The different stages in supply chain system of food processing are as following:

Different stages of processing of manufactured food products

The existing institutions like local bodies, cooperatives and self- help groups as well as new concept such as contact farming and cooperative farming can be utilized to strengthen the backward linkages. For example, the experience of Pepsi foods for its tomato processing plant in Hoshiarpur in Punjab.

On the other hand, Forward integration is a part of supply chain in which the food processing company expands its activities in downstream areas i.e. marketing for fresh and processed products to get more control over sales, consumer contacts and eliminate any middleman if any to provide maximum benefit to the customer. For example, Rythu Bazar in Andhra Pradesh is one of the most successful models of direct agricultural marketing in the country. Rythu Bazars provide facilities to farmers for selling their produce directly to consumers under a proper administrative system and government protection.



11. What do you mean by Upstream and Downstream requirements in the Food Processing industry? Also, explain the importance of Supply Chain Management in the Food Processing Industry.

Approach:

- Define upstream and downstream in food processing industry.
- Elaborate on the upstream and downstream requirements.
- Define Supply Chain Management and explain its importance.

Answer:

The complete framework from storage of raw materials, inventory and finished goods from point of origin to point of consumption process of movement of material consists of two stages, namely upstream and downstream.

Student Notes:

Requirements of Upstream in Food processing industry:

- Accessibility to raw materials is the first upstream requirement for any industry.
- The food processing industry also requires modern extraction techniques.
- To make the food processing industry sustainable, it is important to ensure good linkages with farmers.
- The storage facilities for raw materials like Grains, Meat, Fish etc. are important part of food processing upstream requirements.
- Food processing industry also requires good quality testing facilities.
- Transport facilities are essential part of upstream requirements of food processing industry in India.
- The food industry also requires a sizable amount of work force.

Requirements of Downstream in Food processing industry:

- The downstream stage in the production process involves processing of the materials collected during the upstream stage into a finished product.
- The downstream stage also includes the actual sale of product to customers like businesses, governments or individuals. Since, downstream processing has direct contact with customers through the finished product; it requires a large work force.

Importance of Supply chain Management-:

Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption. Good supply chain links helps farmers, manufactures, wholesalers, retailers and consumers. Importance for different stakeholders is:

For Farmers:

- Makes it easier for farmers to sell their goods at better prices
- Facilitates investment in agriculture
- Results in use of new technologies to increase productivity
- Results in creation of rural infrastructure

For Consumers:

- Availability of healthy, nutritious food material
- Avoidance from inflationary pressures
- Access to varieties of processed food

For Industries:

- Easy access to raw materials
- Quality controls and regulations
- Healthy competition

India can become the food supplier of the world**.** The food processing industry has an important role to play in linking farmers to the final consumers in the domestic as well as the international markets. Supply chain management is critical in achieving that goal.

12. What is a sunrise industry? Elaborate on the potential of these industries in India with a special focus on the food processing industry.

Approach:

- Explain the term sunrise industry and give a few examples of such industries in India

Student Notes:

- Discuss the potential of these industries in India.
- Elaborate on the food processing in India, its contribution and its growth prospects
- List a few initiatives taken by the government to give impetus to the food processing industry.

Answer:

A sunrise industry is an emerging industry that is looked upon as a favourable investment venture by investors. Sunrise industries are deemed as engines of future economic growth due to their steadily rising generation of employment and profit prospects. Proliferation of these industries will lead to product diversification and reduced costs due to backward and forward linkages

India is expected to continue on a path of economic expansion and these industries in several sectors such as food processing, fisheries, tourism will benefit from increased investment and liberalization of government policies.

Food Processing Industry in India:

- Food processing industry accounts for 32 per cent of India's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth.
- It contributes around 14% of manufacturing GDP, 13% India's exports and 6% of total industrial investment.
- The high potential of food processing industry in India is due to following factors:
  - Provides linkages between agriculture and manufacturing
  - Packaged food in busy life
  - Reduce food wastage
  - To promote crop diversification
  - Increased export earnings
  - Will curb food inflation
- Even with such high potential issues like supply side limitations, infrastructure bottlenecks, issues associated with regulatory environment remains. To tackle these issues government has taken various initiatives. For example:
  - National Mission for food processing
  - Allocation of Rs 1,500 crore and announcement of various measures under the Merchandise Exports from India Scheme (MEIS), including setting up of agencies for aquaculture and fisheries in coastal states and export incentives for marine products
  - Setting up mega food parks
  - 100% FDI in trading of food products, including through e-commerce, among others.
  - Modernization of abattoir
  - Integrated cold chain

13. Enumerating the features of Pradhan Mantri Kisan Sampada Yojana, discuss its potential for the growth of food processing sector in the country.

Approach:

- Highlight the importance of food processing sector.
- Enumerate the features of Pradhan Mantri Kisan Sampada Yojana.
- Discuss its potential for the growth of food processing sector in the country.

Student Notes:

Answer:

Food Processing Sector has emerged as an important segment of the Indian economy in terms of its contribution to GDP, employment and investment. During 2015-16, the sector constituted as much as 9.1 and 8.6 per cent of GVA in Manufacturing and Agriculture sector respectively.

Recognizing its importance, Ministry of Food Processing Industries launched Pradhan Mantri Kisan SAMPADA Yojana (Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters) for the period 2016-20. It is is expected to leverage huge investment, benefit 20 lakh farmers and generate 5 lakh direct/ indirect employment in the country by the year 2019-20. The whole objective is to supplement agriculture, modernize processing and decrease agri-waste.

Components of PMKSY:

- **Mega Food Parks**: Create modern infrastructure facilities for food processing along the value chain from farm to market with strong forward and backward linkages through a cluster-based approach.
- **Integrated Cold Chain and Value Addition Infrastructure**: Provide integrated cold chain, preservation and value addition infrastructure facilities without any break in order to reduce post-harvest losses of horticulture and non-horticulture agri-produce.
- **Creation / Expansion of Food Processing & Preservation Capacities**: Modernisation/ expansion of existing food processing units with a view to increasing the level of processing, value addition
- **Infrastructure for Agro-processing Clusters:** Development of modern infrastructure and common facilities to encourage group of entrepreneurs to set up food processing units based on cluster approach.
- **Creation of Backward and Forward Linkages**: Plugging the gaps in supply chain in terms of availability of raw material and linkages with the market
- **Food Safety and Quality Assurance Infrastructure:** Adhering to Total Quality Management (TQM); meeting the stringent parameters prescribed by the food safety regulator etc.
- **Human Resources and Institutions:** Improving research & development, undertaking promotional Activities, skill development, strengthening of Institutions etc.

Potential for growth of food processing sector

The major challenges in food processing sector lie in poor linkages and supply chain as well as technological applications. Also, sanitary and phytosanitary regulations hamper the access to export market. The PM Kisan Sampada Yojana addresses these crucial bottlenecks, because of which the potential is far from being realized.

Moreover, in the event of people leaving farming as a livelihood activity, food processing sector has the potential to create those jobs where such released agricultural labour can be gainfully employed.

Thus, it is a comprehensive package which will result in creation of modern infrastructure with efficient supply chain management from farm gate to retail outlet. It will not only provide a big boost to the growth of food processing sector in the country but also help in providing better returns to farmers and is a big step towards doubling of farmers income. It will create huge employment opportunities especially in the rural areas, reducing wastage of agricultural produce, increasing the processing level and enhancing the export of the processed foods.

Student Notes:

14. Contract farming can help in the expansion of organized food processing industry in India by strengthening backward linkages. Comment. What changes are required in the existing regulatory structure to address issues related to contract farming in India?

Approach:

- Briefly define contract farming.
- Discuss the significance of contract farming for food processing industry.
- Discuss the existing regulatory structure.
- Suggest the changes required to facilitate contract farming.

Answer:

Under contract farming, agricultural production is effectuated on the basis of a pre-harvest agreement between **buyers**, such as food processing units and exporters, and **producers**, such as farmers or farmer producer organizations (FPOs). The contracts minimize market risk for the producer as he has the agreement to sell the required quantity at a pre-determined price. The buyer benefits as it is ensured of the raw material of desired quality and required quantity. .

Significance of contract farming for food processing

- India is endowed with wide variety of agro-climatic conditions producing diverse crops in different seasons. Contract farming harnesses this advantage by linking farms to food processing sector in regular and planned manner. It links Indian farmers to global supply chains.
- It makes farming an organised activity and help in improving quality and quantity of production.
- It ensures a fix source of income for majority of Indian farmers who are small and marginalized.
- It reduces the risk for the producer against risk of fluctuating market price and demand, while buyer can reduce the risk of non-availability of quality produce.

Issues with current regulatory structure

Since contracts are typically made between large multinationals as buyers and small farmers as producers, there is an inherent inequality. Also, violation of contracts has relatively little cost to the company but may be catastrophic for the farmer. Situations like these arise because of weak regulatory and enforcement mechanism.

- Discrediting role of Agricultural Produce Market Committees (APMCs) as registration and dispute settlement authorities, in most states.
- Provisions of stockholding limits under Essential Commodities Act that restrict buyers from entering into contracts.
- Placement of “contract” in the Concurrent List, and ‘agriculture’ in the State List of the Constitution that complicates enforcement.
- Inadequate mechanisms for quick disposal of contract-related disputes.

Measures needed

Considering the above issues, the government has come up with **draft Model Contract Farming Act, 2018** which contains the following provisions:

- Contract farming to be outside APMCs’ supervision.
- Dedicated dispute settlement mechanism for quick disposal of disputes.
- Price protection to farmers, and penalizing provisions for breach of contract from either side.

Student Notes:

- Bar on transfer of ownership of farmer's land to the contracting companies to protect farmers.
- Non-application of stockholding limits on agricultural produce purchased under contract farming.

Though the new draft Act tries to overcome many shortcomings, it is important to realize that the core problem of Indian agriculture is the nature of its marketing structure. Thus, the Act should be complimented by marketing reforms, which will generate a huge amount of backward integration.

15. Highlighting the potential of micro and small enterprises in the food processing sector, enumerate the challenges that they face. In this regard, discuss the importance of the Scheme for Formalisation of Micro Food Processing Enterprises (FME).

Approach:

- State the potential of micro and small enterprises in the food processing sector.
- List the challenges faced by the micro and small enterprises in the food processing sector.
- Explain the significance of the Scheme for Formalisation of Micro Food Processing Enterprises (FME) in this regard.
- Conclude accordingly.

Answer:

Micro and small enterprises constitute an important component of the food processing sector. They constitute almost **98% of the sector** and 66 per cent amongst them are based in rural areas.

These units account for **74% of employment** in the food processing sector. Moreover, the micro food processing sector has the potential to **generate an additional 9 lakh skilled** and **semi-skilled jobs**. The importance of micro food enterprises also lies in its contribution to **increase in exports and GDP**, and **inclusive growth**. Strengthening micro and small food enterprises will lead to **reduction in food wastage**, creation of **off-farm job opportunities**, and aid in achieving the overarching objective of **doubling farmers' income**.

Challenges faced by micro and small food processing sector:

- **Credit related issues**: Due to high cost of institutional credit, the sector is largely dependent on informal sources for funding. Lack of sufficient collateral and high working capital needs hinder the expansion plans.
- **Lack of access to modern technology**: Due to their unorganised nature, the micro and small food enterprises lack access to new technology and innovation.
- **Lack of forward linkages:** It leads to low outreach and non-availability of newer markets.
- **Compliance with health and safety standards**: The need for such compliance results in rising costs for the small enterprises. On the other hand, low quality products impact export competitiveness.
- **Inadequate infrastructure:** A lot of produce from the farm gate is lost due to inadequate cold chain infrastructure as well as logistics infrastructure, which predominantly rely on traditional modes.
- **Ease of Doing Business**: Government procedures and rules for establishing new units often lead to delays in getting clearances.

Student Notes:

Keeping in mind the above identified issues and at the same time promote the vision of 'Vocal for Local', **Scheme for Formalisation of Micro Food Enterprises** has been launched by the government. This will help micro food processing enterprises become more competitive and enable economies of scale across the production value chain. The scheme is important in the following ways:

- **One District One Product (ODOP) Approach:** It adopts a **cluster-based approach** across states to reap benefits of scale in terms of procurement of inputs, availing common services and marketing of products.
- **Strengthening capacities of support systems**: It will leverage the collective strength of FPOs, SHGs, Cooperatives and existing FP enterprises in the unorganized sector by:
  - Skill training, seed capital to SHGs for loan to members for working capital and small tools,
  - Grant for backward/forward linkages, common infrastructure, packaging, marketing and branding.
- **Increase in access to credit:** It envisages increased access to credit by existing micro food processing entrepreneurs, women entrepreneurs and entrepreneurs in the Aspirational Districts.
- **Infrastructural development**: Support will be provided through credit linked capital subsidy for development of common infrastructure including common processing facility, lab, warehouse, etc.
- **Enhanced compliance with food quality and safety standards**: The scheme aims to help nearly two lakh unorganised micro-food enterprises achieve technical upgradation in line with FSSAI's standards as well give them marketing and branding support.
- **Focus on perishables:** It extends Operation Greens Scheme to include all fruits and vegetables for better price realisation for farmers and reduction in wastage.

By adopting a **convergence framework**, this scheme makes an attempt to fill in the gaps, where support is not available from other sources, especially for capital investment, handholding support, training and common infrastructure.

LAND REFORMS IN INDIA

Student Notes:

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Student Notes:

1. Introduction

The genesis of the structure of power and authority in rural India can be traced to land. There is an ever-changing relationship between land, power and people. The shifting nexus between the rural elite and agrarian power structure centres around issues relating to land, which is one of the primary sources of existence in as much that land provides basic necessities like food, clothing and shelter to man.

The value of land is ever increasing and requires little renewal and replacement. Due to this basic utility, economists tend to treat land as a special kind of property. In a narrow sense, land reform means the distribution of surplus land to small farmers and landless tillers, accrued as a result of the implementation of the ceiling on agricultural holdings. More broadly, it includes regulation of ownership, operation, leasing, sales, and inheritance of land (indeed, the redistribution of land itself requires legal changes).

Land reforms have been major instruments of social transformation, especially in an economy based on feudal and semi-feudal production relationships. The main objective of land reform programme is not only to increase agricultural production, but also to build an egalitarian social order as contemplated under the Constitution of India. Thus, land and land reform issues are the focal point of the political and economic agenda of the country. This also lays a sound foundation for variable growth, to enable India to compete in the global market. A land reform policy is fundamentally a politico-economic issue and in most cases it is the result of a peoples' movement.

2. Need for Land Reforms in India

In India, the need for land reform can be traced to peasants' aspirations to own the land they cultivate, obtain tenancy rights thereupon, or seek rationalisation and reduction in rent. Land reform generally reflects public policy of land redistribution for the benefit of the landless, the tenants and the small farmers. It aims at diffusion of wealth, increase in income and productive capacity. There is a shortage of land and uneven distribution of ownership. Agriculture in India is small peasant based and as such land reforms assume greater importance, not only in the context of social justice and equitable distribution, but also from the point of view of production and agricultural trade. Not surprisingly, it received top priority on the policy agenda at the time of Independence.

Moreover, land reform policy has economic, social and political dimensions. The economic dimension of land reforms involved the ownership of land by a small group that did not actually cultivate but exploited the actual tillers who were the tenants and agricultural labourers. On the other hand, because of inadequacy of returns and absence of surplus with the tenants, they could not undertake improvements on land. The landlords, having no personal interest in the lands they owned, did not take interest in investing on land improvement. As a result, land productivity went on declining. This explained the dynamics of underdeveloped agriculture.

As far as the sociological dimension is concerned, traditionally, the upper castes owned land and the lower castes were the tenants/agricultural labourers. Even today, we do not find the lower castes owning land in any significant measure and the upper castes working as tenants/agricultural labourers in India. This social dimension perpetuated the social inequalities. It is here that the economic inequality created under the economic dimension got reinforced by the social inequality in agrarian relations.

Coming to the political dimension, it may be noted that, historically, the owners of land have been supporters of the governments in power. This was much more evident during British rule in India. Because of the numerical minority position of the former zamindars and the later landlords and their economic stranglehold over the tenants, they depended on the government for their protection, (thus promoting their own self-interest). At the same time, the government depended upon them for its own survival so long as tenants, though large in number, did not

organise themselves against the exploitative political and social systems. This has been the experience of almost all countries that faced agrarian problems.

3. Objectives of Land Reforms in India

The important objectives of land reform measures in India were:

a) To enhance the productivity of land by improving the economic conditions of farmers and tenants so that they may have the interest to invest in and improve agriculture.
b) To ensure distributive justice and to create an egalitarian society by eliminating all forms of exploitation.
c) To create a system of peasant proprietorship with the motto of land to the tiller.
d) To transfer the incomes of the few to many so that the demand for consumer goods would be created.

4. Historical Background

During the ancient as well as medieval period, the principal unit of land settlement in India was the village. Land was never considered to be the property of the King or the Sultan; it was the property of the village, the entitlement of the King being limited to a share of usufruct for the protection he gave in return. Since land revenue was the main source of state revenue, the village became the agency for collection and unit of revenue assessment.

At the time of independence, there were three types of land tenure system prevailing in the country - the zamindari system, the mahalwari system, and ryotwari system. The basic difference in these systems was regarding the mode of payment of land revenue. In zamindari system, land revenue was collected from the farmers by zamindar, in mahalwari system by the village headman on behalf of the whole village, while in ryotwari system the land revenue was paid to the state directly by the farmers.

As a result of these systems, some features pervaded pre-independent India like feudal agrarian structure, exploitation, low agricultural productivity, shortage of food grains and unbalanced cropping pattern. These land systems were based on exploitation with difference only in degree, decreasing in order from zamindari to ryotwari. A small group of large landowners, including absentee landlords had land rights. The vast majority of cultivators did not have any right or had limited rights as tenants or sub-tenants. The poor mostly leased-in land for subsistence. If the tenants used improved seeds, manure or extra labour, they had to share half of the increased produce with the landlords. Even before independence it was widely recognised that the main cause of stagnation and social injustice in economy was the stagnation in the agricultural sector and this stagnation could, to a large extent, be attributed to exploitative agrarian relations. When India became independent, policy makers felt the system of cultivation by tenants had to be overhauled as it was highly exploitative.

5. Land Reforms in India

After Independence, attempts had been made to alter the pattern of distribution of land holdings on the basis of four types of experiments, namely:

a) Land reforms "from above" through legislation on the lines broadly indicated by the Central Government, enacted by the State legislators, and finally implemented by the agencies of the State Government.
b) Land reforms "from above" as in the case of Telengana and the naxalite movement also to some extent in the case of the "Land Grab" movement.
c) Land reforms through legislative enactments "from above" combined with peasant mobilisation "from below" as in the case of controlled land seizure in West Bengal and protection of poor peasants in Kerala.
d) Land reforms "from below" through permission of landlords and peaceful processions by peasants as in the case of Bhoodan and Gramdan.

Student Notes:

5.1. Legal Framework for Land Reforms

While recognizing the need to bring about land reforms in the country, the Constitution of India provided under Article 39 that:

1) The ownership and control of the material resources of the country should be so distributed as best to serve the common good; and
2) The operation of the economic system should not result in a concentration of wealth or a means to production to the common detriment.

However, under the Indian Constitution, land reform is the responsibility of individual states so while the federal government provides broad policy guidelines, the nature of land reform legislation, the level of political will and institutional support for land reform and the degree of success in implementing land reform have varied considerably from state to state with the agenda remaining unfinished in most states.

5.2. Measures undertaken for Land Reforms

Land reform legislation in India consisted of four main categories:

a) Tenancy regulation that attempts to improve the contractual terms faced by tenants, including crop shares and security of tenure.
b) Abolition of intermediaries who were rent collectors under the pre-Independence land revenue system.
c) A ceiling on landholdings with a view to redistributing surplus land to the landless.
d) Attempts to consolidate disparate landholdings.

The first category of land reform, namely **tenancy reform**, imposed regulation that attempted to improve the contractual terms faced by tenants, including crop shares and security of tenure. Under the British land-revenue system, large **feudal landowners (zamindars)** received the rights to collect tributes from peasants in exchange for a land tax paid to the state. Almost half of the land was under this system at the time of Independence. This system was considered exploitative, and abolition of intermediaries was aimed at curtailing the power of these large landowners and ensuring that the cultivator of the land was in direct contact with the government, which minimized unjust extraction of surplus by the landowner.

The third form of land reform was the imposition of a **ceiling on landholdings** that aimed to redistribute surplus land to the landless. Finally, **consolidation of landholdings** constituted the fourth kind of land reform, which ensured that small bits of land belonging to the same small landowner but situated at some distance from one another could be consolidated into a single holding to boost viability and productivity. Because of variation in land quality across plots, this measure has been difficult to implement.

Abolition of intermediaries is generally agreed to be one component of land reforms that has been relatively successful. The record in terms of the other components is mixed and varies across states and over time. For example, under the ceiling law only 1.7 per cent of total cultivated area has been declared surplus and only 1 per cent of it has been distributed. Landowners naturally resisted the implementation of these reforms by directly using their political clout and also by using various methods of evasion and coercion, which included registering their own land under names of different relatives to bypass the ceiling, and shuffling tenants around different plots of land, so that they would not acquire incumbency rights as stipulated in the tenancy law, and possibly even outright eviction.

The general assessment on land reforms in the Indian context is rather negative. For example, the report of the Task Force on Agrarian Relations of the Planning Commission of India (1973) had the following overall assessment of land reforms in India: '*The programmes of land reform adopted since Independence have failed to bring about the required changes in the agrarian structure.'* The report directly blames the political will of the state governments for this failure:

Student Notes:

The lack of political will is amply demonstrated by the large gaps between policy and legislation and between law and its implementation. In no sphere of public activity in our country since Independence has the hiatus between precept and practice, between policy pronouncements and actual execution been as great as in the domain of land reforms.

Land policy in India has undergone broadly four phases since Independence.

1. **The first and longest phase (1950 - 72)** consisted of land reforms that included three major efforts: abolition of the intermediaries, tenancy reform, and the redistribution of land using land ceilings. The abolition of intermediaries was relatively successful, but tenancy reform and land ceilings met with less success.
2. **The second phase (1972 - 85)** shifted attention to bringing uncultivated land under cultivation.
3. **The third phase (1985 - 95)** increased attention towards water and soil conservation through the Watershed Development, Drought-Prone Area Development (DPAP) and Desert-Area Development Programmes (DADP). A central government Waste land Development Agency was established to focus on wasteland and degraded land. Some of the land policy from this phase continued beyond its final year.
4. **The fourth and current phase of policy (1995 onwards)** centres on debates about the necessity to continue with land legislation and efforts to improve land revenue administration and, in particular, clarity in land records.

Land policy has also been one of the important components incorporated in all the plans. The policy statements are sometimes quite explicit in the plan documents, but are more often implicitly stated. An overview of changes in the land policy as reflected through the various plan documents is as follows:

Land Policy formulation through Planning Period

Plan Period	Major Issue	Policy Thrust
First Plan 1951 – 56	Area under cultivation to be increased. Community Development (CD) networks to take care of the village commons. Vast uncultivated lands locked under large sizes of holdings.	Land reforms to bring in the fallow under cultivation and increase land use efficiency. Tenant to be given the rights to cultivate land. Abolition of intermediaries.
Second Plan 1956 - 61	Concern about vast rain fed agriculture, low land productivity and thrust on irrigated agriculture.	Soil conservation as an important programme. First phase of land reform implementation. Irrigation development for the rain fed areas. Training and extension work for the technology through CD.
Third Plan 1961 – 66	Food security concern dominated. Cultivable waste land to be brought under cultivation. Bringing the lagging regions under mainstream growth.	Area development as an approach. Intensive area development programme adopted for selected districts. An integrated land policy approach was inherent. Soil surveys were taken up.
Fourth Plan 1969 - 74	Emphasis on food security continued as minimum dietary requirements to be met. Incentives were created for diversion of land towards food crops and enhancing the capacity of such land. Domination of large holding sizes and low allocation and technical efficiency.	Increased emphasis on irrigation and soil conservation in dry land regions and technological change introduced. Higher cropping intensity the main concern. Second phase of land reforms with land ceiling acts and consolidation of holding. Institutional changes brought in.

Student Notes:

Fifth Plan 1974 – 79	Problems of degradation land management in irrigated command areas surfaced. Drought prone areas attracted attention.	Drought-prone area development. Desert area Development programmes, and soil conservation started and further enhanced. New impetus to dry farming.
Sixth Plan 1980 – 85	Underutilization of land resources. Drought prone areas continued to attract attention. Attention lagging areas on the background of green revolution required cultivation	Land and water management programme under drought-prone area programme in selected areas.
Seventh Plan 1985 - 90	Soil erosion and land degradation surfaced as major issues. Land going out of cultivation. Deforestation and degradation of forest lands.	Soil and water conservation and averting land degradation. Specific attention to degraded lands. Wastelands Development programmes. Long-term view of land management.
Eighth Plan 1992 - 97	Dry land and rain fed areas requiring attention. Degradation of land in irrigated command areas. Peoples' participation surfaced as major issue in land management at village level.	Emphasis on watershed approach. Soil conservation merged with watershed programmes. Agro climatic regional planning approach incorporated.
Ninth Plan 1997 - 2002	Land degradation increased significantly. Integrating Watershed Development Programme across various components. Rethinking on land reforms. Gap between potentials and actual crop yields need to be bridged. Need for a long-term policy document.	Bringing the underutilized land under cultivation. Management of wastelands. Maintenance of village commons. Decentralized land management system. Panchayat Raj institutions to manage the village lands. Rethinking on land legislation.
Tenth Plan 2002-07	Land Acquisition, Forest Land, Land record, urban land etc.	SEZ Act, Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and Rules, 2007 etc.
Eleven Plan 2007-12	Land records management	Merge the two existing Centrally-sponsored schemes of Computerization of Land Records (CLR) and Strengthening of Revenue Administration & Updating of Land Records (SRA&ULR) and to replace them with a modified Centrally-sponsored scheme in the shape of the National Land Records Modernization Programme (NLRMP).
Twelve Plan 2012-17	Land Acquisition, Rehabilitation and Resettlement	LARR 2013

Following the recommendation of Kumarappa Committee; the Indian National Congress appointed the Agrarian Reforms Committee under the Chairmanship of J.C. Kumarappa, for making an in-depth study of the agrarian relations prevailing in the country and the states enacted legislation for the abolition of intermediary tenures in the 1950s, although the nature and effects of such legislation varied from state to state.

The Bhoodan movement was launched in 1951. Vinoba Bhave hoped to eliminate private ownership of land through Bhoodan and Gramdan and maintained that the movement would go a long way to ensure just redistribution of land, consolidation of holding and their joint cultivation.

Student Notes:

In May 1955, the Planning Commission set up a panel on land reforms under the chairmanship of Gulzarilal Nanda for reviewing the progress of land reforms in the country. The committee made recommendations related to absolute limit to the quantum of agricultural land (ceiling), inducting capital investment for land, encouraging personal cultivation, ending uncertainty in land sector; and providing work and security to the landless.

The chronological analysis of the all Five-Year Plans makes it clear that since the inception of planning in India, the approach to rural development and land reforms focussed on areas like consolidation of holdings, redistribution of ceiling surplus lands and wastelands, tenancy reforms, making legal provision for giving private land on lease for cultivation and agri-business; computerisation, updation and improvement of land records, recognition of women's rights in land etc.

In the wake of economic reforms, land reforms appear to have taken a back seat in India. Sometimes even the philosophy of redistribution of land through land reforms is questioned. However, the argument that land reforms stand in the way of market-led growth appears to be misplaced. The experience of countries like Japan and Korea shows that land reforms can help in faster and more sustainable development of capitalistic agriculture, without creating much pain for the rural population. But market-led economic reforms, not accompanied by land reforms, could be painful for the rural poor and may not be sustainable in the long run.

India's land policy interventions during the last five decades can be assessed based on their impact on various parameters, including alleviation of poverty, conflict management and equity, sustainable economic development, environmental impact, and production efficiency. The land policy interventions have had varying impacts across the states, depending in large part on the agrarian situation and the extent to which a given policy was implemented.

5.2.1. Digital India Land Record Modernization Programme

The Land Reforms (LR) Division was implementing two Centrally Sponsored Schemes viz.: Computerisation of Land Records (CLR) & Strengthening of Revenue Administration and Updating of Land Records (SRA&ULR). Later in 2008, the Cabinet approved merger of these schemes into a modified scheme named Digital India Land Records Modernization Programme (DILRMP) or NLRMP. The main aims of DILRMP are to usher in a system of updated land records, automated and automatic mutation, integration between textual and spatial records, inter-connectivity between revenue and registration, to replace the present deeds registration and presumptive title system with that of conclusive titling with title guarantee.

The DILRMP has 3 major components:

a) Computerization of land record
b) Survey/re-survey
c) Computerization of Registration

The District has been taken as the unit of implementation, where all programme activities are to converge. It is hoped that all districts in the country would be covered by the end of the 12th Plan period except where cadastral surveys are being done for the first time.

6. Land Acquisition in India

Till 2014, the Land Acquisition Act, 1894 regulated the process of land acquisition. While the 1894 Act provided compensation to land owners, it did not provide for rehabilitation and resettlement (R&R) to displaced families. These were some of the reasons provided by the government to justify the need for a new legislation to regulate the process of land acquisition. Additionally, the Supreme Court had also pointed out issues with determination of fair compensation, and what constitutes public purpose, etc., in the 1894 Act. To this end, the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 was passed by the Parliament, in 2013.

Student Notes:

6.1. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013

- The Act provided for land acquisition as well as rehabilitation and resettlement. It replaced the Land Acquisition Act, 1894.
- The process for land acquisition involves a Social Impact Assessment survey, preliminary notification stating the intent for acquisition, a declaration of acquisition, and compensation to be given by a certain time. All acquisitions require rehabilitation and resettlement to be provided to the people affected by the acquisition.
- Compensation for the owners of the acquired land shall be four times the market value in case of rural areas and twice in case of urban areas.
- The new law stipulates mandatory consent of at least 70 per cent for acquiring land for public-private-partnership (PPP) projects and 80 per cent for acquiring land for private companies.
- Purchase of large pieces of land by private companies will require provision of rehabilitation and resettlement.
- The provisions of this act shall not apply to acquisitions under 16 existing legislations including the Special Economic Zones Act, 2005, the Atomic Energy Act, 1962, the Railways Act, 1989, etc.

6.2. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Second Amendment) Bill, 2015

- This Bill amends the principal Act passed in 2013.
- It enables the government to exempt five categories of projects from the requirements of: (i) social impact assessment, (ii) restrictions on acquisition of multi-cropped land, and (iii) consent for private projects and public private partnerships (PPPs) projects.
- The five categories of projects are: (i) defence, (ii) rural infrastructure, (iii) affordable housing, (iv) industrial corridors, and (v) infrastructure including PPPs where government owns the land.
- The Act would apply retrospectively, if an award had been made five years earlier and compensation had not been paid or possession not taken. The Bill exempts any period when a court has given a stay on the acquisition while computing the five year period.
- The Act deemed the head of a government department guilty for an offence by the department. The Bill removes this, and adds the requirement of prior sanction to prosecute a government employee.

7. Analysis of Land Reform Measures

While the abolition of intermediaries is no longer a pressing concern, success in achieving the objectives of redistribution of ceiling surplus land to the landless and security of tenancy varies among the states. There exist obstacles to identifying ceiling surplus land in the form of common subterfuges such as dividing the land between family members and benami transactions.

A related issue is the security of tenancy; along with ensuring protection from arbitrary eviction and overcharging of rent, land reform framework must also contend with the question of whether tenants are to be given ownership of the land.

Unfortunately, the implementation of land reform legislation has largely ignored the importance of providing special protection to women in granting them fair share of land. Nepal, for example, has a land reform law that pays special attention to the needs and issues of women. It is especially important that any programme of land reform provides for special protection of women, especially those who are managing small farms. Encouraging collective

farming through self-help groups, credit schemes and agricultural extension programmes designed for women can help resolve this problem.

Deliberate policy interventions that see a shift in policy in favour of small farm holdings are needed. It has also been suggested by scholars that having a progressive land tax, based on the size of the ownership, could incentivise the sale of some of the larger land possessions. While such options cannot be discounted, they must be examined carefully before steps are taken.

8. Future of Land Reforms

Redistribution of public lands is an easy first step in land reforms. Land reform in Philippines is one of the best examples to learn from, having successfully redistributed 63% of the total land targeted, most of which have been either public land or have been obtained through voluntary sale.

However, in India, almost everywhere, land reform has met with strong resistance from the landed elite. During the Tebhaga movement in West Bengal, the resistance to amendments in the Bengal Tenancy Act was so great, that the government had to abandon the project. Enormous political will is the key to attaining fruition of the land reform agenda.

Experience further shows that simply redistributing land from the rich to the poor may not be enough to attain the objective of a more egalitarian rural society. First, an important problem that must be dealt with is the protection of the redistributed land against land-grab. Often, due to greater bargaining power and the use of muscle power, landowners have been able to regain the land allotted to the farmers, either through sale or through force. Therefore, land reform law cannot stop only at redistribution of the land, but must also ensure their security.

Secondly, the land that is redistributed may not be sufficient to meet the basic needs of those who have newly acquired it. For instance, it has been reported that, at times, while land was allotted to SC/ST families, it was useless because either the plot belonged to somebody else or was on stony, infertile land. Thus, any land reform measure must aim to procure 'secure and productive' land and redistribution rights.

A bottom up approach is necessary for success in land reform. Legislators must ensure participation of the farmers in deciding boundaries, noting claims and complaints and recording opinions and objectives of the village members. In Madhya Pradesh, the formation of district-level task forces to settle land related grievances greatly aided the reform process. In Kerala, the government officers went to the villages and spoke to the farmers to verify boundaries; in West Bengal the government conducted camps to spread awareness and familiarise them with official procedures.

9. Suggestions for the Future

a) **Awareness Creation:** Making farmers aware of their rights and familiarising them with official procedures will go a long way in building confidence and removing their fear of big landowners. At the same time, large landowners should be sensitised to the vulnerability of the landless and the important role of the owners in ameliorating their situation. A simple step towards this would be making available all rules and guidelines in the local language.
b) **Collective action:** Government should facilitate organization of farmers' groups and cooperatives so that they can lobby together for the fulfilment of their demands and also act as protection against abuse and exploitation. Collective action, especially for women, through self-help groups can greatly aid their empowerment.
c) **Preventing loss of farmland:** Farmers also lose land by a high degree of distress sales done due to lack of access to institutional credit, unfavourable pricing, contract farming, etc. Implementation of a Debt Relief Act to help with debt management as well as amendment to property law will help prevent loss of farmland.

Student Notes:

d) **Plugging loopholes in existing land reform framework:** Often, landowners evade land ceiling laws by taking advantage of the loopholes in the existing system, by selling or transferring land to family members or through other subterfuges.
e) **Introducing a comprehensive reform package:** A land reform legislation is not complete without support policies and hence it is necessary to ensure that a comprehensive package is introduced, including easy credit facilities to farmers, asset and food subsidies, infrastructural facilities, establishment of cooperatives, etc.
f) **Drafting model central legislation:** A central legislation could be drafted that acts as a model for the states to use as a guide for framing their own law. Such legislation could suggest a common ceiling limit and include provisions for support facilities, etc.
g) **Inclusion of special protection for women in legislation:** It is important to make special provisions for the protection of women, by ensuring them individual land rights and granting equal status in credit and subsidy schemes.
h) **Periodic assessment of implementation:** Periodic assessment by independent research groups will help determine the effectiveness of the reform and make necessary changes.
i) **Updated recording of land title:** In many cases, existing land records are false or obsolete, and these need to be updated and verified to reflect the actual situation. Moreover, documentation must be modernized and computerised.
j) **Fast track courts on land disputes:** Setting up of fast track courts for the adjudication of land disputes and dealing with grievances related to land, can reduce the delays in acquiring title and reduce harassment and expense. Cases that involve Scheduled Castes and Scheduled Tribes should be given special cognizance.
k) **Strengthening National Land Reform Council:** The National Land Reform Council lacks mandatory powers as Land Reform related issues essentially fall under the domain of state governments. This can be remedied by amending the Constitution to include the National Land Reform Council and giving it powers to, among other things, ensure proper implementation of legislation. This is an important step in the struggle for emancipating the estimated forty percent of our population that forms the rural landless.
l) **Role of panchayats and gram sabhas:** Consultation with local bodies such as the gram sabha before framing rules on land distribution will ensure a more participatory process and will also hold greater chances of success, provided the landed gentry is not given a greater say.

10. Previous Years UPSC Mains Questions

1. Discuss the role of land reforms in agricultural development. Identify the factors that were responsible for the success of land reforms in India.
2. Establish the relationship between land reform, agriculture productivity and elimination of poverty in Indian Economy. Discussion the difficulty in designing and implementation of the agriculture friendly land reforms in India.

11. Previous Years Vision IAS GS Mains Questions

1. ***The most appropriate way to counter the ills in the practice of tenancy in rural India is to legalise it. Discuss.***

Approach:

Discuss the basic objectives and problems surrounding tenancy reforms in India. Answer should clearly bring out the inadequacies in current policy measures to effectively implement the tenancy reforms. The last part of the answer should suggest measures to improve the implementation of tenancy reforms (either by legalizing it or other methods).

Student Notes:

Answer:

One of the major aspects of the land reforms in India has been the tenancy reform. The reforms aimed to eliminate all forms of exploitation and social injustice within the agrarian system, to provide security for the tiller of the soil and to remove such impediments to increase in agricultural production as arise from the agrarian structure inherited from the past.

The prohibition of tenancy has not really ended the practice. On the other hand, it has resulted in agricultural practices that are not conducive to increased production. This, in turn, also depresses employment opportunities for the landless agricultural laborers.

The ban on tenancy, which was meant to protect tenants, has only ended up hurting the economic interests of the tenants as they are not even recognized as tenants. As a result, they are denied the benefits of laws that provide security of tenure and regulate rent.

Although attempts have been made to provide security of tenure, redistribution of land and fixation of fair rents, yet informal or oral tenancy has continued to exist even to this day. The term informal tenancy is referred to as oral tenancy which refers to tenancy without legal sanctions and permissions, or without any written agreement. The principal of shifting to informal tenancy is to extract higher land rents from the tenants. This is primarily done so as to get high yielding varieties program that has brought a realization among the landlords that land is a very valuable asset and promises high rates of return. India, which is marked by land hunger, it is possible here to take advantage of the situation by charging higher rents. Also, informal tenancy arrangements are a convenient device with the landlords for nullifying tenancy reforms. Thus, unrecorded or clandestine tenancy perpetuates a semi-feudal land system that was sought to be abolished by measures of land reforms.

Thus it can be concluded that despite lot many efforts to keep away with ill practices associated with tenancy, it would be better to legalize it so as to get the tenants their due. What is needed at the moment is to formulate a proper policy backed by necessary amendments and changes in the existing laws. The need of the hour is to ensure the tenancy rights.

The policy dialogue and debates on agricultural land tenancy could benefit from:

1. More empirical evidence (translated into coherent policy recommendations) on current tenancy restriction impacts on the poor and the likely effects of liberalizing such restrictions;
2. A livelihoods perspective on the topic;
3. A more coherent and consistent message from pro-poor constituencies that tenancy liberalization may make sense.

2. The scope of Land reforms needs to be widened beyond the mere activity of redistribution of land and fixing land ceilings to a systemic restructuring that undertakes reforms in the sector of energy and water. Discuss.

Approach:

The answer should first explain the inadequacy of the current land reforms to make farming more productive and viable. Then it should illustrate the need for a multipronged approach, which includes building requisite infrastructure and distribution of services, with focus on irrigation and electricity, to develop the agricultural sector.

Answer:

Student Notes:

Land reforms in India have been undertaken with the objective of achieving social equity in access to land and improving farm productivity to make agriculture economically more viable. Both the targets have met with only little success. One of the many reasons for their failure has been a compartmentalised approach to land reforms adopted in the country. The overall target of robust agricultural growth can only be achieved when land reforms are increased in scope from a mere redistribution exercise to an activity to improve inherent productivity and farming capability. Provision of infrastructure in form of electricity and water supply would be crucial for this.

Indian agriculture is now characterised by low viability and high vulnerability. High input costs and lesser realisation of final costs make agriculture less viable. Smaller size of landholdings, about 63 percent with less than 1 hectare, constrains the use of mechanised farm inputs to increase production. Also, in cases where land distribution has taken place, the land is often of poor quality, making economic viability even more challenging. Vagaries of monsoon, with about 2/3rd of total area dependent on rainfall for agriculture, lend high vulnerability to agriculture. Apart from it, exposure to volatile markets also increases vulnerability.

To address these issues, comprehensive agricultural reforms are required. Structural reforms include development of irrigation infrastructure and access to continuous power; institutional reforms include making available modern scientific inputs and data, along with modernisation of agricultural marketing methods and provision of insurance cover.

Following reforms in irrigation and energy sector can be considered for national rural development:

- Rationalizing water charges, improving collection rates and reforms in irrigation financing in order to make state irrigation departments financially self-sufficient.
- Improvements in irrigation systems by organizing farmers to take up operation and management responsibilities.
- Flood irrigation systems, which are wasteful as well increase salinity and water logging should be replaced by more efficient drip and sprinkler irrigation with government support.
- Institution of a system of water rights and modernization of irrigation agencies to make them more autonomous and accountable.
- Rationalisation of energy pricing – flat rate system should be disbanded to disincentivise over extraction from ground.
- Jyotigram scheme of Gujarat, where electricity to farm tube wells is provided only for certain part of the day, which achieved considerable success, should be tailored to all India level after incorporating local agricultural requirements.
- To address theft, High Voltage Distribution Systems (HVDS), which use Direct Current for transmission can be installed (as is being done in Punjab and Andhra Pradesh). These require initial high investment, but are efficient and will almost eliminate theft through technical barriers to tapping of power lines.

The movement from agriculture to other economic activities in past has been because of push from agriculture rather than a pull from the other activity. To make agriculture sustainable, it must continue to grow at least at 4 percent when national growth is 6-7 percent. It must be made economically attractive as well as sustainable to pursue as an occupation in order to sustain food security of the nation. Widening the scope of land reforms to energy and water sector would help meet these requirements.

Student Notes:

3. "Contract farming with the government playing facilitator and umpire can be beneficial to farmers". In this context, critically analyse the scope and utility of contract farming in India.

Approach:

- Write briefly about the changing scenario of agriculture and its consumption.
- Write why there is a need of contractual farming and how it can act as a panacea for poor farmers.
- Write various ways in which government can encourage both the farmers and entrepreneur for contract farming.
- Conclusion.

Answer:

The Indian agri-food system is undergoing a rapid transformation with front end activities like wholesaling, processing, logistics and retailing are rapidly expanding and consolidating, the backend activities of production agriculture have been continuously fragmenting. The challenge lies in linking the two ends and ensuring viable business opportunities for both farmers and agri-business.

The recent growth and diversification of consumer demand and the expansion of organized agricultural processing and marketing ventures has given large scope to the contract farming. There are other various emerging scenarios which ensure wider scope and utility of contract farming. These can be summed up as follows:

- Loss of actual price realisation to farmers in the present system.
- Fragmentation of land holdings put limit on profitability of farm produce.
- While smallholders, by virtue of available family labour and intensive cultivation practices, can be highly productive, they typically have a small marketable surplus and face high transaction costs in marketing their produce. The contract farming can provide them direct access to market without intermediates and thus can be instrumental in development and welfare of small farmers.
- Contract farming provides the mechanisms for streamlining procurement and logistics services that are high on the agenda of organized retailers and agro-processors.

In order to augment the reach of bank credit and increase the production of commercial crops as also for creation of marketing avenues for the farmers, all contract farming arrangements are made eligible for availing special refinance package from NABARD.

Government need to provide necessary support for sensitising initiatives and to study the details of functioning and performance of contract farming arrangements. The government may conduct workshops for better interface among farmers and entrepreneurs, conduct crop specific studies, follow-up with National Agricultural Insurance Corporation for insurance of crops grown under contractual arrangements etc. to enhance the utility of contractual farming.

For the development of contract farming in India, the government also needs to act as a regulator and power broker between the corporates and the farm owners where the power asymmetry is huge. The arrangement needs to be backed by an effective statutory and regulatory mechanism with avenues for the farmers for speedy redressal of their grievances.

Student Notes:

4. Highlight the role of institutional farm credit mechanisms in facilitating the process of land reforms in India. How can cooperative societies bring a faster change in this respect?

Approach:

- Firstly mention how institutional lending sources i.e. banks affected the process of land reforms - impact on moneylenders, which section of farmers benefitted the most, effect on prevailing agrarian structure etc.
- Also mention the failure of institutional lending sources on this front.
- Mention how cooperative societies have affected the same structures and whether they could bring about a faster change in agrarian structures.

Answer:

Reorganizing agrarian relations was the main aim of land reforms in India. The hold of moneylenders over the peasantry was to be weakened by providing credit through institutional sources initially by credit societies and later by nationalized commercial banks.

With the imposition of social control and later their nationalization, commercial banks were asked to lend to the agricultural sector on priority basis. Over the years the dependence of rural households on informal sources has come down significantly. While empowering the vulnerable marginal land holder, institutional lending has also empowered women.

However, institutional farm credit mechanisms had limited impact on overall agrarian relations. The low level of education and awareness among the rural populace keeps them from utilizing credit facilities to their potential. Also, informal tenants cannot gain access to capital from banks and financial institutions. A recent study of a spate of farmers' suicides in Karnataka found that many of them were informal tenants who borrowed from moneylenders and could not pay back because of high interest rates.

Yet institutional credit has played an important role in making the green revolution a success and uplifting of millions out of poverty.

Also, cooperatives working in rural areas are playing noteworthy role in rural lending. Initially cooperatives were just to provide credits to the farmers through resource pooling. Gradually the role of cooperative societies grew to encompass socio-economic development and eradication of poverty in rural India. It also became an integral part of five year plan, and thereby, a fundamental part of our economy.

However, assessment studies have showed that much of their credit went to relatively better of sections and the poor continued to depend on more expensive informal sources. This was explained as a consequence of the prevailing structure of land tenures. The state response was to bureaucratize the cooperative societies, though in some regions this helped in releasing credit societies from the hold of big landowners.

Overall the contribution of cooperatives has been positive, but there is scope for improvement by improving women participation. Legalizing tenancy will also help to bring the small and marginal tenants within the ambit of institutional credit. Recent amendment of Constitution making provisions for autonomous and democratic functioning of *cooperatives* will go a long way in this regard.

Student Notes:

5. Explaining the rationale behind ceiling on agricultural land holdings, discuss whether land ceiling has stifled agricultural growth in India.

Approach:

- In the introduction explain land ceiling and the logic behind its implementation.
- While giving points both in favour and against the positive relation between land ceiling and agricultural growth.
- Conclude by logically favouring one of the two.

Answer:

Land ceiling refers to fixing the maximum size of a land holding that an individual or a family can own. The surplus land may then be appropriated and distributed according to the law. By the end of 1961, as per the directions from the centre, most of the states passed their land ceiling acts.

Rationale behind ceiling on agricultural land holdings:

- Largely the rationale behind ceiling on agricultural land holdings aligned with the objectives in the provisions of the Directive Principles of State Policy delineated in Articles 38 and 39 (c) of the constitution.
- To reduce the exploitation of the landless tenant farmers.
- To reduce concentration of wealth in the hands of a few.
- To promote of social justice by reducing the inequality in power and fostering cooperation among the people.

The impact of land ceiling on agricultural productivity has engendered a debate that can be understood through following arguments:

- **Arguements in Favour:**
  - Before ceiling, large areas belonging to big farmers remained uncultivated. Ceiling brought more area under cultivation.
  - Ownership of land led small farmers to take more interest in increasing production.
  - Studies testify that because of involvement of the entire family, small farms yielded more production per hectare.
  - Overall, agricultural output has increased manifold over the years.
- **Arguements Against:**
  - Because of land ceiling, enterprising farmers were unable to enlarge their holding by buying or leasing lands of small farmers. This way, large economic holdings with high agricultural productivity could not become a reality.
  - Small farms hinder mechanised farming thus hampering productivity.
  - Small farmers have limited capital to improve production.
  - Because of small land holding size, the input costs are high, causing agriculture to be non-remunerative and productivity to be low.
  - Very little of the surplus land was distributed, and hence a most of it remained uncultivated.

At the outset land ceiling was an important, and necessary, measure for equitable growth in the country. Over the years the size of an economic agricultural holding decreased due to scientific advancements. It is evident that Indian farmers have produced record crop year after year. Thus, it cannot be argued that land ceiling has had an adverse impact on the agricultural productivity in India.

Student Notes:

6. Enumerating the objectives of land reform policy in post-independence India, critically examine its implementation and achievements.

Approach:

- Mention the objectives of land reforms and explain its significance in post-independence era.
- Mention the measures taken for land reforms since independence. Substantiate your points.
- Evaluate their implementation and achievements. Discuss both the pros and cons of land reform policies undertaken by the successive governments.

Answer:

The important objectives of land reform measures in India were:

- To enhance the productivity of land by improving the economic conditions of farmers.
- To ensure distributive justice and to create an egalitarian society by eliminating all forms of exploitation.
- To create a system of peasant proprietorship with the motto of land to the tiller.
- To transfer the incomes of the few to many so that the demand for consumer goods would be created.

Keeping in mind these objectives, land reform legislations touched upon these measures:

- Abolition of intermediaries
- Tenancy reforms
- Ceilings on holdings
- Consolidation of holdings
- Development of cooperative farming

Implementation of land reforms

- Abolition of intermediaries: By 1972, all the States had passed laws to abolish intermediaries. But there was no clear mention about just and equitable compensation. Nearly 57.7 lakh hectares were distributed to landless agriculturists after the successful completion of the Zamindari Abolition Act. Although, intermediaries were abolished, but the rent receiving class continued to exist.
- Tenancy reforms: The objective of providing security of tenure to all tenants met with only limited success. But there are success stories such as those of Kerala and West Bengal. The continued existence of large number of insecure tenants made the successful implementation of the second major objective of reducing rents to a 'fair' level, almost impossible to achieve. The objective of the acquisition of ownership rights by tenants too was achieved only partially.
- Land ceilings: The long delay, and the nature of the legislation, ensured that the ceilings would have a limited impact.

There are many factors responsible for the tardy progress but important among them are the lack of adequate direction and determination, lack of political will, absence of pressure from below, inadequate policy instrument, legal hurdles, absence of correct-up-dated land records and the lack of financial support.

Achievements

- Land reforms were implemented within a modern democratic structure without any violence or use of force.
- Institutional changes enabled the bringing in of modern, progressive farming.
- Rack-renting the peasantry and extraction illegal cesses had become a thing of the past.
- State demand from the peasant also gradually virtually disappeared.

Student Notes:

7. It is argued by many that there is an urgent need for states to reform land laws and, in particular, tenancy laws. What are the factors cited for the need of such reforms? Identify the impediments in the way of such reforms and highlight the benefits that would accrue from them.

Approach:

- The answer should begin with brief introduction about land and tenancy laws.
- Mention the factors responsible for the need of tenancy law reforms in India.
- Then, identify the roadblocks in the way of reforming them. Further, mention the expected benefits after successful reforms in tenancy laws.

Answer:

Tenancy reforms aim at redistributing ownership over the land holding from the view point of social justice, and reorganizing operational holdings from the viewpoint of optimum utilization of land. Growth in population and the decline in joint families in Indian society have led to the fragmentation of land holdings leaving nuclear families with small plots that barely meet their food requirements.

Need for tenancy reforms:

- Significant tracts of land remain barren and uncultivated even after fragmentation of the land among nuclear families.
- To give legal status to tenancy: Land leasing option faces legal difficulties as most States either ban tenancy or permit it strictly in certain circumstances. This has become a hindrance in progressive revenue models like that of Contract farming.
- To encourage owners to take up non-farm jobs as they are hesitant now as they may lose the ownership over the land if leased out.
- Due to flawed tenancy laws or their absence, farmers don't have farm security, which reduces their incentive to improvise and make long term investment in that farm.
- It is essential that we raise prosperity in agriculture as rapidly as possible as a large number of workforce will still remain dependent on agriculture in the years to come.
- The existing tenancy laws only pertain to individual tenants and cultivators and not institutions. Land owners who have land that they are unable to cultivate can be encouraged to lease them to land banks.

Roadblocks in the way

- We lack digitised data and records of the landholdings of the people with the government, which act as a major impediment in the way of tenancy reforms.
- Complexity of land laws and the conflicts between centre and state implementing agencies creates issues.
- There is a plethora of pending cases in the courts of laws.
- Government on various occasions face protest from the public and opposition in an attempt to introduce the land bill. Political will, hence, remains a major case of concern too.

Expected benefits after tenancy reforms:

- Reforming tenancy laws and replacing them with contracts will protect property rights, bring more land under cultivation, and encourage investment. Returns for cultivators and owners both will increase.

Student Notes:

- Legal documents can lead to improvement in the terms of land use and facilitate access to credit and other social security benefits from the government for tenants and cultivators.
- This would give greater sense of security to the owner who wants to lease out land and it will also give greater certainty of tenure to the tenant.
- It will open doors for the consolidation of the operational land holdings.

The tenancy reforms indeed are an important step. The equitable distribution will require creating good jobs in the industries and services to which some landless rural workers and marginal farmers can migrate. To achieve this aim we should enact Model Land Leasing Act proposed by NITI Ayog.

E-TECHNOLOGY IN THE AID OF FARMERS

Student Notes:

Contents

Student Notes:

1. Introduction

Agriculture sector in India in one of the important sectors. It is the primary source of livelihood for about 58% of India's population. It contributes about 18% of GDP. Growth in GVA in agriculture and allied sectors stood at 4% in FY20.

Electronic-technology (**E-technology**) is used as an overarching term incorporating all modes of transmission like electronic devices, satellite communication, mobile, services and applications which help to disseminate information with the help of technology.

- These facts points to major structural issues with the sector in India which has stemmed the growth trajectory of the agricultural sector.
- Farm sector growth has been stunted by low productivity, fragmented landholding, recurrence of over/under production reflecting a clear market asymmetry, lack of good agricultural practices and reforms in farm marketing.
- Globalization has also posed newer challenges for the sector where the farmers have to produce quality product at par with world market at reasonable prices
- Thus, the farmers need to be well informed and well trained in the management of natural resources and production of agricultural commodities.
- E-technology can play an important role in addressing these challenges and uplifting the livelihood of Indian farmers.

E-agriculture is a term to study the role of Information and Communication Technology in agricultural development. Simply speaking, it is a way of harnessing the power of ICT in agricultural domain.

2. Uses of e-technology for farmers

E-technology can help agriculture sector, particularly in the following ways:

- **Improved decision making** by dissemination of **relevant and timely information** to farmers regarding:
  - Agro-inputs such as seeds, fertilizers, pesticides etc.
  - crop and soil health management
  - Weather forecasting and disaster preparedness
  - Agro processing, market support and marketing of agriculture produce
  - Agro-finance and management of farm agri-business
  - Suitable government schemes
  - Localized information on specific farm and agriculture related subject around village/block/district/state
- It can help in **improving skills and productive capacities** of farmers while ensuring cost effectiveness, viability and sustainability of the farming practices.
- It can facilitate linkages with academia, industry and government agencies.
  It will help farmers access information and knowledge about emerging technologies and find suitable markets for their produce.

Experts opine that introduction of IT in agriculture can bring **another Green Revolution** in India with **easy and cost effective information** to the farmers at the right time.

3. Drivers of E-technology in Agriculture

Following main trends have been the key drivers of the use of e-technology in agriculture:

- low-cost and pervasive connectivity and adaptable and more affordable tools due to booming mobile, wireless, and Internet industries
- advances in data storage and exchange due to continuous research in IT sector
- innovative business models and partnerships with government and private sector collaborations
- the democratization of information, including the open access movement and social media

Student Notes:

4. Initiatives Related to E-technology to Aid Farmers

Governments and private sector have launched a number of e-technology initiatives to harness the potential of e-technology to tackle various challenges. Some of these initiatives are:

4.1. National e-Governance Plan in Agriculture (NeGP-A)

The Government is implementing a Centrally Sponsored Scheme **"National e-Governance Plan in Agriculture (NeGP-A)"** in the entire country. The Programme aims to achieve **rapid development of agriculture in India** through **ICT enabled multiple delivery channels such as Internet, Touch Screen Kiosks, Krishi Vigyan Kendras , Kisan Call Centres (KCC), Agri-Clinics, Common Service Centers (CSCs), Mobile Phones (Broadcast, IVRS, interactive messaging using unstructured Supplementary Service Data and Voice Recognition** for ensuring timely access to agriculture related information for the farmers of the country. A number of applications in agriculture and allied sector have been developed under the project for providing integrated ICT based services to farmers.

4.2. Information Technology Vision 2020

The **National Agricultural Policy** lays emphasis on the use of Information Technology for achieving a more rapid development in India. Accordingly, the Department of Agriculture and Cooperation (DAC) has formulated information technology vision 2020. This **vision states** that:

- Information relating to agriculture sector would be available to the ultimate users–the farmers for optimizing their productivity and income.
- Extension and advisory services making use of information technology would be available to the farmers on round the clock basis.
- The tools for information technology will provide networking of agriculture sector not only in the country but also globally and the Union and State Government Departments will have reservoirs of data base and

Department of Agriculture & Cooperation has also developed more than 80 portals, applications and websites (primarily in collaboration with the National Informatics Centre) covering both the headquarters and its field offices/ directorates. The important portals include SEEDNET, DACNET, and AGMARKNET (discussed later).

4.3. Kisan SMS Portal

Government of India, in 2013, developed an SMS Portal for Farmers for dissemination of relevant information, giving topical and seasonal advisories and providing services through SMSs in local languages. It is an integrated Farmers' Portal developed completely in-house by Department of Agriculture and Cooperation.

The **main features** of the Kisan SMS Portal include:

- They can register their queries, about the weather report, soil type, prospects and problems of market and so on by using this SMS portal.
- The relevant information will be provided to farmers in their own or regional languages.
- The SMSs will get transmitted only to the farmers within the territorial jurisdiction of an officer, scientist or experts for the crop or agricultural practice that such a farmer might have opted for.
- The farmers will get the information, services and even some advisories through this portal. The content may include information about the schemes, advisories from the experts, markets.
- The officers can send SMS to the farmers belonging to the entire area of their jurisdiction or a part of it.
- This Portal will also integrate existing farmer database of the farmers.

Possible benefits of the scheme:

- Timely crop advisory will lead to the adoption of relevant and appropriate technologies suited to local condition.
- Information on schemes and programmes of Government of India can help every farmer to reap benefit out of these schemes thus widening the footprint of these schemes.
- On the onset of any adverse weather condition, advice can be provided to the farmers on effective resource to be adopted.
- Outbreak of the disease/pests can be controlled as advisories can be provided immediately to the farmers in and around the area of initial report of the disease/pest.
- Selection of suitable and better variety/breed by the farmer based on the information/ advisory can provided to him/her.
- Timely market information will give better bargaining power to the farmer.

4.4. Kisan Sabha App

- The app aims to provide the most economical and **timely logistics support** to the farmers.
- It also intends to increase the profit margins for farmers by **minimizing interference of middlemen** and directly connecting with the institutional buyers.
- It will also help in providing **best market rates** of crops by comparing nearest mandis, booking of freight vehicles at cheapest cost thereby giving maximum benefit to the farmers.
- It acts as a **single stop for every entity related to agriculture,** be they a farmer who needs better price for the crops or mandi dealer who wants to connect to more farmers or truckers who invariably go empty from the mandis.
- Kisan Sabha also **provides a platform for people who want to buy directly from the farmer**

4.5. Crop Insurance Mobile App

- Crop Insurance mobile app has been developed as an **initiative under Digital India** which can be used to **calculate the Insurance Premium for notified crops** based on area, coverage amount and loan amount in case of loanee farmer.
- It can also be used to get details of normal sum insured, extended sum insured, premium details and subsidy information of any notified crop in any notified area.

4.6. National Agriculture Market (e-NAM)

It is a **pan-India electronic trading portal**, which seeks **to connect existing APMCs** and other market yards to create a unified national market for agricultural commodities.

Vision

- To promote uniformity in agriculture marketing by streamlining of procedures across the integrated markets, removing information asymmetry between buyers and sellers and promoting real time price discovery based on actual demand and supply.

Mission

- **Integration of APMCs** across the country through a common online market platform to facilitate pan-India trade in agriculture commodities, providing better price discovery through transparent auction process based on quality of produce along with timely online payment.

Some key features:

- **Integration of Negotiable Warehouse Receipt System (e-NWRs) Module with e-NAM:** It will enable small and marginal farmers to directly trade their stored produce from selected Warehousing Development and Regulatory Authority (WDRA) registered warehouses which are declared deemed market by the State.

Student Notes:

- **Farmers Produces Organization (FPO) module:** It will enable Farmer Producers' Organisations (FPOs) to upload the picture of their produce and quality parameters from their premise/collection centres for bidding. Distant bidders can visualise the produce before bidding by seeing the pictures and quality. After successful bidding, FPOs can deliver the produce from their premises or by bringing it to mandi.
- **Logistic Module:** A provision has been made for linking large logistic aggregator platforms providing choices to users. Presently, e-NAM provides a database of individual transporters to the traders. Traders will be able to use the link to navigate to the logistics provider's website and select appropriate services. With these additions, more **than 3,75,000 number of trucks from large logistic providers would be added for logistic purpose. This will help in seamless transportation of agri-produce.** This will promote inter-state trade by providing online transport facilities for distant buyers.

Potential benefits of the schme

- **Increase operational efficiency** and transparency in the mandi operations
- **Enhance market access** and more options for farmers through warehouse based sales
- Larger national market for secondary trading for the local trader in the mandi
- **Reduction in intermediation costs** for bulk buyers, processors, exporters etc.
- Eliminate information asymmetry
- It will lead to common procedures for issue of licenses, levy of fee and movement of produce. In coming years, it will result into higher returns for farmers, lower transaction costs to buyers and stable prices and availability to consumers
- It will also help in emergence of **value chains by promoting scientific storage** and movement of agricultural goods.

Already 585 mandis in 16 States and 2 Union Territories have been integrated on e-NAM portal and will be soon expanded to cover additional 415 mandis, which will take the total number of e-NAM mandis to 1,000.

4.7. Seednet

- Seednet India Portal is a National Initiative for information on Quality Seeds by Union Ministry of Agriculture and Farmers Welfare.
- Users can find **information on seed sector in India**, quality control, seed replacement rate, seed multiplication ratio, breeder seeds, foundation seeds, certified seeds, etc.
- Details related to seed varieties, seed bank, seed testing labs, seed dealers, test laboratories, certification agencies, etc. are also available on the portal.

4.8. DACNET

- Department of Agriculture and Cooperation (DAC) Ministry of Agriculture launched a project called DACNET to take the benefit of information technology in services that it provides and improving its governance.
- DACNET has proved very useful in reducing the processing time for certain services provided by the department from more **than one year earlier to less than three months.**
- DACNET's key criteria included ease-of-use, speed of information delivery, low incidence of errors, reduction in corruption, and affordable services.

4.9. AGMARKNET

- AGMARKNET, (Agricultural Marketing Information Network) is a joint venture of the Directorate of Marketing and Inspection (DMI) and the National Informatics Center(NIC).
- Currently, **it covers 2800 market nodes and 300 commodities** and provides information in ten languages. It has increased the efficiency in marketing activities by establishing a nation-wide information network, which provides information on prices, arrivals, availability, trends, analysis, laws etc.

Student Notes:

- These **timely information data** are helpful to producers, traders and consumers. It has been connected to 670 agricultural produce markets and 40 State Agricultural Marketing Boards and Directorates.
- Each **AGMARK portal of wholesale market** provides daily information to AGMARK portals of its respective states, and then each state's AGMARK portal sends the information to the AGMARKNET portal. T
- he National Information System maintains all of these portals. The food processing units, traders and different village kiosks, to help the farmers in taking the right decisions mainly use these portals.

4.10. Kisan Call Centres (KCC)

- **"Kisan Call Centres (KCCs)",** launched in 2004, is aimed at answering farmers queries on a telephone call in farmers own dialect. This Scheme provides agriculture related information to the farming community through toll free telephone lines.
- **A countrywide common eleven digit number has been allotted for Kisan Call** Centre. The number is accessible through all mobile phones and landlines of all telecom networks including private service providers. Replies to the farmers' queries are given in **22 local languages.**

4.11. AGRISNET

- Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India is implementing a Central Sector Plan Scheme **"Strengthening/ Promoting Agricultural Informatics & Communications"** of which one of the component is AGRISNET.
- The objective of AGRISNET is to provide improved services to the farming community through use of Information & Communication Technology(ICT).

5. Private Sector Initiatives

5.1. Green SIM

- This programme is implemented by **IFFCO Kisan Sanchar Limited (IKSL).** The features of IKSL services include delivering up to four free voice messages on areas of interest, and have a helpline services managed by experts and organize phone-in programmes and mobile-based quizzes.
- **Farmers' queries are given in 22 local languages.** The messages are delivered daily in regional languages and have content in 16 different categories which includes Agriculture, Horticulture, Animal Husbandry, Floriculture, Poultry, Irrigation, Fertilizers, Insurance, Banking, Rural Health and so on.
- To increase the access of information, **IKSL have an online portal** (voice, text and images) which can be accessed by anyone anytime and even on a mobile app.

5.2. Facebook for Farmers and Extension Workers

- The social media platform such as Facebook is being effectively used in Kerala for reaching out to farmers and extension workers. Based on the success of using Facebook by the **Vattamkulam Krishi Bhavan (Malappuram District, Kerala), the Government of Kera**la has decided to officially include Facebook as an important tool to strengthen the extension activities of the Department of Agriculture.

Student Notes:

- The **state agriculture department** has urged all the officials under it to extend the activities of the department through the social media to enhance the productivity and profitability of farming.
- All the farmers registered with the department will have to maintain a social media account to be in touch with the local Krishi Bhavan. The government has mandated that all agricultural officers should have active Facebook accounts.

5.3. E-choupal

- The **e-Choupal initiative of ITC Ltd.** to provide farmers the information they need to be more successful.
- This platform also enables buyers to come to the farmers instead of having to haul the produce to market, where oftentimes traders manipulate the market in order to exploit the farmers out of their proper earnings.
- The **initiative also provides access to storage services** and agricultural equipment in addition to other important assets for rural farmers.
- The e-Choupal network has expanded to 6,500 centers synchronizing the efforts of 40,000 villages to produce greater quantities of better produce and profit.

5.4. SasyaSree

- **"SasyaSree** – a One Stop Telugu portal for Information Dissemination" was initiated based on the identified need of having locally specific, demand driven knowledge solutions in local language through a web portal.
- The project caters to eight districts in Andhra Pradesh by documenting the best crop management practices, information related to Government schemes, market price and other information needs of the farming community in local language by means of video, audio, photographs etc. The project also tries to integrate with other public extension initiatives and provide information on other allied sectors such as animal husbandry, poultry etc.

5.5. mkrishi

- Tata Consultancy Services (TCS), India's leading IT firm, offers personalized advisory services in voice and visual formats using communication devices such as mobile phones through its **mKRISHI platform**.

5.6. eSagu

- eSagu is an IT-based personalized agro-advisory system developed by IIIT Hyderabad. . It aims to improve farm productivity by delivering high quality personalized (farm-specific) agro-expert advice in a timely manner to each farm at the farmer.

6. Weather based Information through various e-initiatives

- Weather based information on natural calamities like drought etc. is one of the identified services under **NeGP-A** pertains to "**Providing information on Forecasted Weather**" and aims at providing disaggregated District level information in each agro-ecological sub-region on forecasted weather and agro-met advisories through multiple service delivery channels to the farmers (including SMS) .
- Weather related advisory service to farmers under **Gramin Krishi Mausam Sewa** (GKMS) is being implemented by the Department of Agriculture, Government of Maharashtra and India Meteorological Department (IMD), Ministry of Earth Services (MoES), Govt. of India.
- Development of **need based content** on weather information and advisories to farmers has been initiated by IMD, Department of Agriculture, Government of Maharashtra and GIZ,

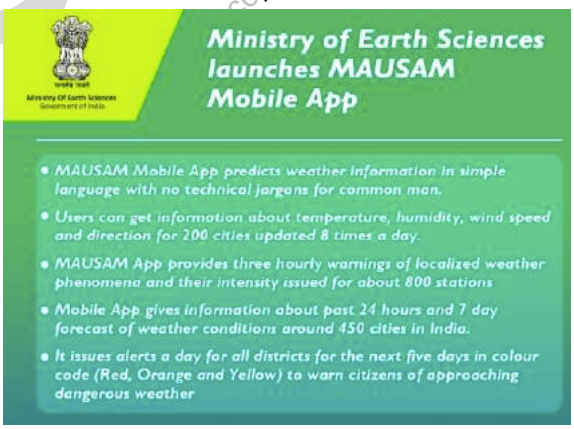
New Delhi under the project on "**Climate Change Knowledge Network – Indian Agriculture (CCKN-IA)**"

- Mahalanobis National Crop Forecast Centre (MNCFC) regularly (on monthly basis) carries out drought assessment at District/sub-district level using **satellite based remote sensing data, rainfall data and ground information** with respect to sowing progression, irrigation percentage, under the **National Agricultural Drought Assessment and Monitoring System** (NADAMS) programme etc. These assessments are communicated to concerned Departments in States including Maharashtra and are also available online on MNCFC website
- IMD in consultation with SAUs, State Department of Agriculture (including Maharashtra) carries out **monitoring of drought and other calamities** at district level based on the observed rainfall and other parameters like Aridity Index, Standardised Precipitation Index, NDVI etc.
- The Union Ministry of Earth Sciences launched two mobiles apps 'Mausam' and 'Meghdoot' to propagate data from the India Meteorological Department (IMD) for public users and those involved in agriculture to track weather updates and other features. The data being fed to the app comes from the state- and district-based IMD weather stations across the country.

7. Digital India and Agriculture Sector

Introduction

- Launched in 2015, the "Digital India" programme envisions empowering citizens with e-access to government services and livelihood related services, among others.
- The project has three core components, viz.
  - digital infrastructure,
  - digital services and
  - digital literacy.
- The mobile phone is the preferred delivery medium with focus on mGovernance and mServices.
- The mAgriculture and mGramBazar, out of the seven components covered under mServices, directly impact agricultural extension and marketing services.



Benefits to the farmers

The programme seeks to

- Transform rural India into a digitally-empowered knowledge economy
- Provide universal phone connectivity and access to broadband in 250,000 villages
- Extend timely services to farmers through information technology and its tools
- Enhance efficiency in agricultural governance through digital literacy and electronic delivery of services.

8. Challenges in E-agriculture

- **Lack of awareness** and literacy among farmers about the use and benefits of e-agriculture.
- **Lack of digital infrastructure** which includes lack of accessibility and affordability to internet, mobile phones, and other ICT devices.
- **Digital Divide** also poses a challenge in adoption of e-agriculture.
- Even where farmers have access to mobile phones, they are reluctant to talk on phone themselves and may employ a middle man who can distort the communication.

Student Notes:

9. Way Forward

Harnessing the full potential of e-agriculture will require the implementation of a complex set of policy, investment, innovation, and capacity-building measures, in concert with beneficiaries and other partners, which will encourage the growth of locally appropriate, affordable, and sustainable ICT infrastructure, tools, applications, and services for the rural economy. Some of the suggestions to accomplish these tasks are following:

Enhancing Rural Access

- Government should introduce and promote the concept of **smart villages** in the policy making as well as administration in order to make villages more techno-savvy and environmental sustainable.
- While investing in communication infrastructure the focus should be on **financially viable and socially acceptable** approaches that are accessible to the rural poor.
- Foster public-private collaborative efforts and cost sharing arrangements to ensure sustainability of rural information centers.
- There is a need to raise awareness and ensure capacity building of rural communities in using and maintaining ICT.
- Also the focus should be on the adoption of information into formats and languages relevant for rural areas. Investment is needed to repackage technical information for farmers and make it available in local languages.
- Existing conventional methods of information sharing (e.g., extension services, radio stations) should be integrated with new communication technologies, which are accessible to farmers.

Education and Sensitization

- Agriculture should be introduced as a subject in school curriculum and computer education should be an important part of Agriculture Education System.
- Development of digital libraries in rural areas can play an immense role in providing adequate learning environment, imparting literacy to rural communities and in transfer of agricultural technologies to farmers
- In India, farmers are reluctant to move away from their traditional methods. They do not want to utilize the system, even if the cost incurred by them is very low. Thus, it is necessary to change the attitude and mindset of the farmers through Behaviour Change Communication (BCC) and make them aware of the benefits of ICT in agriculture.

Market chains

- The growth of communication networks needs to be supported amongst actors in the chain (farmers, transporters, buyers, traders, etc) in order to ensure more equitable, timely and collaborative access to markets for small holders.
- Government should put policies into place that systematically capture local knowledge, ensure appropriate research agenda setting and support the functioning of intermediary organizations.
- Government should aid the process of identification and vertical integration of diverse ICT tools that are employed in present day agricultural practices.

Research and Innovation

- Researchers and extensionists require continued training in how to interact and share knowledge more effectively using the new digital technologies.
- Academic and research data in agriculture, available in the form of journals and research paper needs to be digitalized to facilitate cross flow of information.
- At local and sub-national level, there should be institutional mechanism, mainly multi-stakeholder, to link rural communities with universities, research agencies through intermediary organizations.

Student Notes:

10. Previous Years UPSC Mains Questions

1. How can the 'Digital India' programme help farmers to improve farm productivity and income? What steps has the Government taken in this regards?

11. Previous Years Vision IAS GS Mains Questions

1. Information Technology has a huge role to play in making agriculture a sustainable activity even for smallholder farmers by providing them with necessary information at every stage of farming at the right time. Discuss.

Approach:

The answer should cover all the aspects like improved decision making, better planning, community involvement, etc.

Answer:

Important roles played by information technology in agricultural activities are:

- By providing information about weather and climate, soil conditions, market prices and government policies, information technology can help farmers in making an informed choice regarding the crop to be grown.
- By providing information about the new scientific techniques, newer varieties of specific crops, methods of pest control, etc. information technology can help farmers in maximising their production.
- Information technology can be of great help in bringing different farmer groups and associated people together to discuss and find out the best ways to maximise agricultural production as well as income.
- Most importantly, information technology can provide farmers access to national as well as global markets through price dissemination systems like AGMARKNET and spot exchanges. Hence they can help farmers fetch the most remunerative price for their produce.

Based on the above points it is also clear that no single medium can fulfill the information needs of individual farmers. Hence it is necessary that a combination of group and individual sources of media like radio and mobiles is used to provide farmers all the information which can promote informed decision making by farmers.

2. E-technology has a crucial role in increasing the productivity of agriculture and allied activities in India. Explain. Bring out the major constraints in utilizing e-technology in the Indian agricultural sector.

Approach:

- Briefly write about the need of e-technology in agriculture.
- Explain the different ways e-technology can be used to increase the productivity in agriculture and allied activities in India.
- Bring out the major issues and problems in the implementation of e-technology in agriculture.
- Conclude with brief suggestions.

Answer:

In the context of agriculture, the potential of e-technology can be assessed broadly under two heads: as a tool for direct contribution to agricultural productivity; and as an

Student Notes:

indirect tool for empowering farmers to take informed and quality decisions which will have positive impact on the way agriculture and allied activities are conducted.

- Precision farming, popular in developed countries, extensively uses IT to make direct contribution to agricultural productivity.
- The techniques of remote sensing using satellite technologies, geographical information systems, agronomy and soil sciences are used to increase the agricultural output. This approach is capital intensive and useful where large tracts of land are involved. Consequently it is more suitable for farming taken up on corporate lines.
- The indirect benefits of IT in empowering Indian farmer are significant and remains to be exploited.
- The Indian farmer urgently requires timely and reliable sources of information inputs for taking decisions. At present, the farmer depends on trickling down of decision inputs from conventional sources which are slow and unreliable.
- The changing environment faced by Indian farmers makes information not merely useful, but necessary to remain competitive.

Various programmes have been initiated in this regard such as ITC e-choupal, Rice knowledge management portal, Village knowledge centres, Village resource centres, e-krishi, Mahindra Kisan Mitra etc.

Some of the major constraints in the implementation of e-technology in agriculture in India are:

- **Duplication of efforts:** It is observed that some initiatives have already been made to provide IT based services to rural community. However, duplication of efforts are witnessed as most of the services revolve around limited subjects.
- **Power Supply:** In most of the rural India, power supply is not available for long hours. This will reduce the usefulness of the intended services.
- **Connectivity:** Despite the phenomenal progress made in the recent years, the connectivity to rural areas still requires to be improved. Reliable connectivity is a prerequisite for a successful penetration of IT into rural areas.
- **Bandwidth:** Even in areas where telephone and other communication services exist, the available bandwidth is a major constraint. Since internet based rural services require substantial use of graphics, low bandwidth is one of the major limitations.
- **Restrictions:** government's map restriction policies often threaten to stifle the optimal utilisation of the tools of remote sensing and geographical information systems.
- **Lack of awareness and education:** The majority of farmer community is unaware of the benefits of e-technology. The present technologies are not user-friendly. The success of e-technology depends on the ease with which rural population can use the content.
- **Local languages:** Regional language fonts and mechanisms for synchronisation of the content provide a challenge that needs to be met with careful planning.

Rapid changes in the field of information technology make it possible to develop and disseminate required electronic services to rural India. The existing bottlenecks in undertaking the tasks need to be addressed immediately. A national strategy needs to be drawn for spearheading IT penetration to rural India.

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3. Information and Communications Technology (ICT) has the potential to revitalise the agriculture sector in India. Discuss the initiative taken by the government in this regard along with highlighting the bottlenecks in its implementation. What measures are required to remove these bottlenecks?

Approach:

- First enumerate various digital initiatives by the government.
- In the second part discuss various bottlenecks in implementation of the same faced by the sector with certain suggestions by giving examples of how to tackle the problem.

Answer:

Various initiatives taken by government to make agriculture a tool for inclusive development with the use of ICT are:

- National Agricultural Market through Agri-Tech Infrastructure Fund, an online platform.
- Soil health card.
- TV channel DD KISAN.
- E-Mandi is an electronic market platform to sell the vegetables online at the best prices, for both the retailers and the whole sellers by providing a convenient way to keep the transparency in the whole marketing system.
- Free software by Department of Agriculture & Cooperation to the UTs and the States and there will be a subsidy by the Government of India up to Rs. 30 lakh per Mandi for their infrastructure. Reforms possible in PDS expansion of PDS coverage, computerization, etc.
- mKisan SMS Portal for farmers enables all Central and State government organizations in agriculture and allied sectors to give information/services/ advisories to farmers by SMS in their language, preference of agricultural practices and location.
- Agriclinics to provide **expert** services and advice to farmers on **cropping practices**, technology dissemination, crop protection from pests & diseases, market trends and prices of various crops in the markets and also clinical services for animal health etc.
- Krishi vigyan kendras ***for*** training and education of farmers, entrepreneurs, farm women, rural youth, financial institutions extension functionaries as well as voluntary organizations.

Problems faced by the sector:

- Infrastructure problems like inadequate support of hardware for every village like PCs, internet connectio , printer, etc.
- Problem of continuous electricity supply to be connected to the internet.
- Inadequate trained professional to guide the village common farmer with usage of internet or other software programmes.
- Providing free software and subsidy for hardware components imposes huge financial burden on central government.
- Proper connectivity or expansion of telecom operators in rural areas.
- No adequate promotion to Research or social innovative products in rural backdrop.
- Lack of effective community participation and awareness nationwide.
- Problem of providing ICT facility in local language.

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But all the above problems can be solved by successful completion of some projects and schemes like full electrification of all villages, national optical fiber network, off grid promotion to solar energy, feeder separation for consumers and agriculture, promotion of training to rural youths in computer, awareness programmes about the benefits of use of ICT, linking industry with agriculture to bring in use of technology, etc.

ICT can thus be leveraged for enhancing the capacity of the agriculture sector and improving and diversifying farm incomes.

Student Notes:

STORAGE, TRANSPORT AND MARKETING OF AGRICULTURAL PRODUCE AND ISSUES AND RELATED CONSTRAINTS

Contents

Student Notes:

1. Storage and Warehousing

Introduction

Storage is an important marketing function, which involves holding and preserving goods from the time they are produced until they are needed for consumption.

Need for storage and warehousing

- The agricultural and horticultural crops production has been steadily increasing due to advancement in production technology and high yielding varieties development, but improper handling and storage of these commodities results in high losses before reaching to the consumers.
- Storage is the most important aspect of food supply chain that ensures food security and round-the-year quality food supply of a country.
- According to World Bank Report, the food grains and perishables wasted due to improper storage could be sufficient to feed one third of world poor population.
- Improper handling and storage of the food grains leads to its qualitative and quantitative losses.

Therefore a robust storage set up is an essential precondition for efficient supply chain of agricultural produce. It will :

- Ensure continuous flow of goods in the market.
- Prevent quality of perishable and semi-perishable products from deterioration.
- Ensure stabilization of prices by adjusting demand and supply.
- Provide employment and income through price advantages.
- Enables states to meet a catastrophe or emergency situation.

1.1. Types of Storages

1.1.1. Underground Storage Structures

Underground storage structures are dugout structures similar to a well with sides plastered with cowdung. They may also be lined with stones or sand and cement. They may be circular or rectangular in shape. The capacity varies with the size of the structure.

Advantages

- Underground storage structures are safer from threats from various external sources of damage, such as theft, rain or wind.
- The underground storage space can temporarily be utilized for some other purposes with minor adjustments; and
- The underground storage structures are easier to fill up owing to the factor of gravity.

1.1.2. Surface Storage Structures

Food grains in a ground surface structure can be stored in two ways - bag storage or bulk storage.

A. Bag storage

- Each bag contains a definite quantity, which can be bought, sold or dispatched without difficulty.
- Bags are easier to load or unload.
- It is easier to keep separate lots with identification marks on the bags.
- The bags which are identified as infested on inspection can be removed and treated easily; and
- The problem of the sweating of grains does not arise because the surface of the bag is exposed to the atmospheres.

B. Bulk or loose storage

- The exposed peripheral surface area per unit weight of grain is less. Consequently, the danger of damage from external sources is reduced; and
- Pest infestation is less because of almost airtight conditions in the deeper layers.
- The government of India has made efforts to promote improved storage facilities at the farm level.

1.2. Improved Grain Storage Structures

A. For small-scale storage

- **PAU bin:** This is a galvanized metal iron structure. Its capacity ranges from 1.5 to 15 quintals. Designed by Punjab Agricultural University.
- **Pusa bin:** This storage structure is made of mud or bricks with a polythene film embedded within the walls.
- **Hapur Tekka:** It is a cylindrical rubberised cloth structure supported by bamboo poles on a metal tube base, and has a small hole in the bottom through which grain can be removed.

B. For large scale storage

- **CAP Storage (Cover and Plinth):** It involves the construction of brick pillars to a height of 14" from the ground, with grooves into which wooden crates are fixed for the stacking of bags of foodgrains. The structure can be fabricated in less than 3 weeks. It is an economical way of storage on a large scale.
- **Silos:** In these structures, the grains in bulk are unloaded on the conveyor belts and, through mechanical operations, are carried to the storage structure. The storage capacity of each of these silos is around 25,000 tonnes.

Buffer Stock Policy of the GOI

The concept of buffer stock was first introduced during the IV Five Year Plan (1969-74).

Buffer stock of food grains in the Central Pool is maintained by the GOI for:

- meeting the prescribed minimum buffer stock norms for food security
- monthly release of food grains for supply through TPDS and Other Welfare Schemes
- meeting emergency situations arising out of unexpected crop failure, natural disasters, etc.
- price stabilisation or market intervention to augment supply so as to help moderate the open market prices.

1.3. Warehousing

Warehouses are **scientific storage structures** especially constructed for the protection of the quantity and quality of stored products.

Role of Warehousing

- **Scientific storage:** The product is protected against quantitative and qualitative losses by the use of such methods of preservation as are necessary.
- **Financing:** Warehouses meet the financial needs of the person who stores the product. Nationalized banks advance credit on the security of the warehouse receipt issued for the stored products to the extent of 75 to 80% of their value.
- **Price Stabilization:** Warehouses help in price stabilization of agricultural commodities by checking the tendency to making post-harvest sales among the farmers.
- **Market Intelligence:** Warehouses also offer the facility of market information to persons who hold their produce in them.

Working of Warehouses

- **Acts**: The warehouses (CWC and SWCs) work under the respective Warehousing Acts passed by the Central or State Govt.
- **Eligibility**: Any person may store notified commodities in a warehouse on agreeing to pay the specified charges.

Student Notes:

- **Warehouse Receipt (Warrant)**: This is receipt/warrant issued by the warehouse manager/owner to the person storing his produce with them. This receipt mentions the name and location of the warehouse, the date of issue, a description of the commodities, including the grade, weight and approximate value of the produce based on the present prices.
- **Use of Chemicals**: The produce accepted at the warehouse is preserved scientifically and protected against rodents, insects and pests and other infestations. Periodical dusting and fumigation are done at the cost of the warehouse in order to preserve the goods.
- **Financing**: The warehouse receipt serves as a collateral security for the purpose of getting credit.
- **Delivery of produce**: The warehouse receipt has to be surrendered to the warehouse owner before the withdrawal of the goods. The holder may take delivery of a part of the total produce stored after paying the storage charges.

Types of Warehouses

On the basis of Ownership

a. **Private warehouses**: These are owned by individuals, large business houses or wholesalers for the storage of their own stocks. They also store the products of others.
b. **Public warehouses**: These are the warehouses, which are owned by the govt. and are meant for the storage of goods.
c. **Bonded warehouses**: These warehouses are specially constructed at a seaport or an airport and accept imported goods for storage till the payment of customs by the importer of goods. These warehouses are licensed by the government for this purpose. The goods stored in this warehouse are bonded goods. Following services are rendered by bonded warehouses:
    i. The importer of goods is saved from the botheration of paying customs duty all at one time because he can take delivery of the goods in parts.
    ii. The operation necessary for the maintenance of the quality of goods - spraying and dusting, are done regularly.
    iii. Entrepot trade (re-export of imported goods) becomes possible.

On the basis of Type of Commodities Stored

a. **General Warehouses:** These are ordinary warehouses used for storage of most of food grains, fertilizers, etc.
b. **Special Commodity Warehouses**: These are warehouses, which are specially constructed for the storage of specific commodities like cotton, tobacco, wool and petroleum products.
c. **Refrigerated Warehouses**: These are warehouses in which temperature is maintained as per requirements and are meant for such perishable commodities as vegetables, fruits, fish, eggs and meat.

1.3.1. Warehousing in India

Central Warehousing Corporation (CWC)

Central Warehousing Corporation (CWC) - a Mini Ratna Central Public Sector Enterprise (CPSE) - is a statutory body which was established under 'The Warehousing Corporations Act, 1962'. Its aims to provide reliable, cost-effective, value-added, integrated warehousing and logistics solution in a socially responsible and environment friendly manner.

Functions

- To acquire and build godowns and warehouses at suitable places in India.
- To run warehouses for the storage of agricultural produce, seeds, fertilizers and notified commodities for individuals, co-operatives and other institutions.
- To act as an agent of the govt. for the purchase, sale, storage and distribution of the above commodities.

Student Notes:

- To arrange facilities for the transport of above commodities.
- To subscribe to the share capital of state Warehousing corporations.
- Special storage facilities have been provided by the Central Warehousing Corporation for the preservation of hygroscopic and fragile commodities.
- The corporation has also evolved techniques for the storage of spices, coffee, seeds and other commodities.
- It also provides services in the area of clearing & forwarding, handling & transportation, disinfestation, fumigation etc.

State Warehousing Corporations (SWCs)

Separate warehousing corporations were also set up in different States in the country. The total share capital of the State Warehousing Corporations is contributed equally by the concerned State Govt. and the Central Warehousing Corporation.

Warehousing Development and Regulatory Authority (WDRA)

The Warehousing Development and Regulatory Authority (WDRA) was set up by the Government of India in 2010 to ensure implementation of the provisions of the Warehousing (Development & Regulation) Act, 2007. The main objective of WDRA is to implement **Negotiable Warehouse Receipt (NWR) System** in the country, which would help farmers to store their produce in scientific storage godowns nearby their farms and to seek loan from banks against their NWR.

The **main functions** of the Authority are to make provisions for the development and regulation of warehouses which inter alia includes negotiability of warehouse receipts, registration of warehouses, promotion of scientific warehousing of goods, improving fiduciary trust of depositors and banks, enhancing liquidity in rural areas and promoting efficient supply chain.

Food Corporation of India (FCI)

Apart from CWC and SWCs, the Food Corporation of India has also created storage facilities. The Food Corporation of India is the single largest agency which has a capacity of 26.62 million tonnes.

The Food Corporation of India was setup under the **Food Corporations Act 1964**, in order to fulfil following objectives of the Food policy :

- Effective price support operations for safeguarding the interests of the farmers.
- Distribution of food grains throughout the country for Public Distribution System; and
- Maintaining satisfactory level of operational and buffer stocks of food grains to ensure National Food Security.

Since its inception in 1965, having handled various situations of plenty and scarcity, FCI has successfully met the challenge of managing the complex task of providing food security for the nation. A strong food security system which has helped to sustain the high growth rate and maintain regular supply of wheat and rice right through the year. Today it can take credit for having contributed a great deal in transforming India from a **chronically food deficit country to one that is self-sufficient.**

Golden Principles for Preservation of Food Grains without Deterioration/Loss

- Food grain bags should be received with proper dunnages as per stack plan to facilitate cross ventilation/inspection/QC treatments and ensuring stacks are formed to full capacity and avoid part stacks.
- Maintaining excellent hygienic conditions all around the stacks/ godowns /operational points and avoiding loose spillages by ensuring cleaned spillages are put into palla bags to respective stacks.

Student Notes:

- Effective personal supervision of prophylactic (spraying) treatments with correct dosage and immediate curative treatments (fumigation) on finding insects in a stack to avoid cross infestation.
- Ensuring provision of adequate Tarpaulins/polythene bits at the operational points of receipts/ issues to avoid mixing of spillages with mud and possible losses.
- Ensuring spreading of tarpaulins/polythene bits/gunny wrappers on the decks of trucks before loading of food grains bags to avoid oozing enroute and proper full covering of loaded bags with tarpaulins to avoid pilferages, without complacency.
- Ensuring adequate aeration of stacks by opening all doors on all clear days.
- Completely avoiding dumping of spillages on the stacks.

Procurement of Food grains

To nurture the Green Revolution, the Government of India introduced the scheme of minimum assured price of food grains which are announced well before the commencement of the crop seasons, after taking into account the cost of production/inter-crop price parity, market prices and other relevant factors.

- The Food Corporation of India along with other Government agencies provide effective price assurance for wheat, paddy and coarse grains.
- FCI and the State Govt. agencies in consultation with the concerned State Govts. establish large number of purchase centres throughout the state to facilitate purchase of foodgrains.
- Centres are selected in such a manner that the farmers are not required to cover more than 10 kms. to bring their produce to the nearest purchase centres of major procuring states.
- Price support purchases are organized in more than 12,000 centers for wheat and also more than 12,000 centers for paddy every year in the immediate post-harvest season.
- Such extensive and effective price support operations have resulted in sustaining the income of farmers over a period and in providing the required impetus for higher investment in agriculture for improved productivity.
- Each year, the Food Corporation purchases roughly 15-20% of India's wheat production and 12-15% of its rice production.
- This helps to meet the commitments of the Public Distribution System and for building pipeline and buffer stock.

Issues related to FCI's procurement and storage

According to FCI's own reply to a RTI, as much as 1.95 Lakh MT of food grains was wasted in India between 2005 and March 2013.

Following are some of the major issues:

- **Open ended Procurement:** It means that FCI buys as much grains as the farmers can sell. Not only it strains the already burdened godowns, it also distorts the food grains market. Also it leads to FCI's mounting debts which have increased to an estimated ₹2.55 lakh crore by March 2020.
- **Excess stock:** One of the key challenges for FCI has been to carry buffer stocks way in excess of buffer stocking norms. The underlying reasons for this include- export bans, open ended procurement and no pro-active liquidation policy.
- **Imbalances in storage facilities:** A CAG report of 2013 revealed serious imbalances in availability of storage capacity and huge shortage of storage space in consuming states. According to the report, out of the total storage space, 64% was located in the large procurement states like Punjab, Haryana, Andhra Pradesh, Uttar Pradesh and Chhattisgarh.
- **Non adherence to First in First out principle (FIFO):** The principle mandates that the grain procured earlier needs to be distributed first to ensure that older stocks are liquidated, both across years and even within a particular year. But the CAG report revealed that a total of 126 LMT of food grains pertaining to crop years 2008-09 to 2011-11 was lying in the central pool even in March 2012.

Student Notes:

- **Inadequate storage facility:** There have been instances where the procured grains were stored in open silos. Also the existing storage facility are poorely maintained causing grain damages due to pest attacks.

Recommendations by Shanta Kumar Committee, 2014:

The High Level Committee suggested following reforms to address the issues and challenges related to FCI:

- The FCI should hand over all procurement operations of wheat, paddy and rice to states that have gained sufficient experience in this regard and have created reasonable infrastructure for procurement. And it should move on to help those states where farmers suffer from distress sales at prices much below MSP, and which are dominated by small holdings.
- FCI should outsource its stocking operations to various agencies such as Central Warehousing Corporation, State Warehousing Corporation, Private Sector under Private Entrepreneur Guarantee (PEG) scheme, and even state governments that are building silos through private sector on state lands.
- FCI have to work in tandem to liquidate stocks in OMSS or in export markets, whenever stocks go beyond the buffer stock norms
- FCI should act as an 'agency for innovations in Food Management System' with a primary focus to create competition in every segment of foograin supply chain, from procurement to stocking to movement and finally distribution in TPDS, so that overall costs of the system are substantially reduced, leakages plugged, and it serves larger number of farmers and consumers.

1.4. Cold Storage

- Despite, India being the largest producer of fruits and second largest producer of vegetables in the world, per capita availability of fruits and vegetables is quite low because of **post harvest losses,** which account for **about 25% to 30% of production**. Besides, a sizable quantity of produce also deteriorates by the time it reaches the consumer.
- Most of the problems relating to the marketing of fruits and vegetables can be traced to their perishability. Perishability is responsible for high marketing costs, market gluts, price fluctuations etc.
- At low temperature, perishability is considerably reduced and the shelf life is increased and thus the importance of cold storage or refrigeration.

Need for Cold Storage

- Availability of proper cold storages are important for preserving perishable commodities like milk, meat, eggs, vegetables, fruits, ornamental flowers and other floricultural goods.
- These cold storages give perishable food items a longer shelf life by preventing them from rotting due to humidity, high temperature and micro-organisms. This results in a decrease in loss due to spoilage.
- With an aim to ensure the observance of proper conditions in the cold stores and to provide for development of the industry in a scientific manner, the Govt of India promulgated an order known as **"Cold Storage Order, 1964**" under Section 3 of the **Essential Commodities Act,1955**.
- The Directorate of Marketing and Inspection of the Department of Agriculture and Co-operation provides consultancy and technical services to prospective entrepreneurs for the construction, maintenance and operation of cold storages.
- Directorate of Marketing and Inspection is also involved in - preparation of a master plan for cold storage requirements at micro/macro levels, conducting seminars, problem oriented studies and coordinating research in cold storage.

Student Notes:

Status of Cold Storage in India

The estimated annual production of fruits and vegetables in the country is about **314 million tonnes in 2018-19.** This accounts for **18% of our agricultural output**. Due to diverse agro climatic conditions and better availability of package of practices, the production is gradually rising. Although, there is a vast scope for increasing the production,as the lack of cold storage and cold chain facilities are becoming major bottlenecks in tapping the potential. The cold storage facilities now available are mostly for a single commodity like potato, orange, apple, grapes, pomegranates, flowers, etc. which results in poor capacity utilization.

Storage of foods and Storage Conditions

In general, there are three groups of products:

1. Foods that are alive at the time of storage, distribution and sale e.g. fruits and vegetables,
2. Foods that are no longer alive and have been processed in some form e.g. meat and fish products, and
3. Commodities that benefit from storage at controlled temperature e.g. beer, tobacco, khandsari, etc.

- Living foods such as fruits and vegetables have some natural protection against the activities of micro-organism. The best method of preserving these items is to keep the product alive and at the same time retard the natural enzyme activity which will retard the rate of ripening or maturity.
- Preservation of non-living foods is more difficult since they are susceptible to spoilage. The problem is to preserve dead tissues from decay and putrefaction. Long term storage of meat and fish product can only be achieved by freezing and then by storing it at temperature below -15°C.
- Dairy products are produced from animal fats and therefore non living foodstuffs. They suffer from the oxidation and breakdown of their fats, causing rancidity. Packaging to exclude air and hence Oxygen can extend storage life of such foodstuffs.

Construction of cold storage facility- Assistance from Government

The following support is provided by the Government for construction of cold storages under the following schemes:

- Under the scheme of **National Horticulture Mission**, assistance is provided for development of post-harvest infrastructure including construction of cold storages.
- Under the Scheme of **Technology Mission for Integrated Development of Horticulture in North-Eastern States including Sikkim, Jammu and Kashmir, Himachal Pradesh and Uttarakhand (TMNE)** assistance is provided for post harvest management including for creation/ modernization/ expansion of cold storages.
- **National Horticulture Board** is implementing the scheme of Capital Investment Subsidy for construction/ Expansion /modernization of cold storage and storages for horticulture produce, under which assistance is provided for creation/ modernization/expansion of cold storages.
- **Agricultural & Processed Food Products Export Development Authority (APEDA**) provides assistance under scheme of Infrastructure Development for setting up of integrated pack houses with cold store facilities.
- **Ministry of Food Processing Industries** provides assistance for cold chain infrastructure development including that of cold storages under the scheme for Cold Chain, Value Addition and Preservation Infrastructure.

Student Notes:

1.5. National Policy on Handling, Storage and Transportation of Food grains

With a view to minimize storage and transit losses and to introduce modern technology, the Government approved the National Policy on Handling, Storage and Transportation of Foodgrains in June 2000. Under this policy, integrated bulk handling, storage and transportation facilities to the tune of 5.5 lakh MTs at various locations were created through private sector participation on Build-Own-Operate (BOO) basis.

The main thrust of the policy is:

- declaration of food grains storage as infrastructure
- encouragement of mechanical harvesting, cleaning and drying at farm and market level
- transportation of grains from farm to silos by specially designed trucks
- construction of chain silos at receipt as well as distribution points
- encouraging private sector for building storage capacities in which grains procured by Government agencies would be stored on payment of storage charges
- encouraging private sector for development of infrastructure for the integrated bulk handling, storage and transportation of food grains.

1.6. Integrated Cold Chain Availability Platform

Integrated Cold Chain Availability Platform is envisaged to be a **national database** that enables active linkage between multiple cold-chain assets across owners, promoting integration of use though collaboration. It is a joint effort of various institutions like **National Horticulture Board, Agricultural and Processed Food Products Export Development Authority, Ministry of Food Processing Industries and National Centre for Cold-chain Development**. It is expected to facilitate access to impartial information on integrated cold chain capacities and movement of goods.

Intended users

The intended users include cold-chain asset owners, farm producers, processors, retailers, government agencies.

The platform is aimed to yield following benefits:

- Direct access to nationwide cold storage capacity and flow of Information to users and regulators on operational availability.
- It will allow Farmer producer organizations (FPOs) to plan movement of perishable items movement across country. Also the government would be empowered to plan viable public procurement mechanisms on the basis of available cold-chain infrastructure.
- It will allow alignment of cold storages with marketing act by getting considered as transaction platforms, without the physical diversion of produce to non- cold-chain yards.
- The platform will add transparency to cold-chain development, to regional availability and about trade lanes for perishables. Also an improved demand-supply gap analysis can be done regarding future cold- chain development.

2. Transport

- Ensuring accessibility to food in a country of India's size is a herculean task. The food grains are transported from the surplus States to the deficit States. FCI undertakes movement of food grains in order to:
  A. Evacuate stocks from surplus regions
  B. Meet the requirements of deficit regions for NFSA/TPDS and Other Schemes
  C. Create buffer stocks in deficit regions
- The food grain surplus is mainly confined to the Northern States, transportation involves long distance transportation throughout the country. Stocks procured in the markets and

purchase centers are first collected in the nearest depot and from there dispatched to the recipient States within a limited time.

- Dept. of Food and Public Distribution under Min. of Consumer Affairs closely monitors the movement of food grains and co-ordinates with FCI and Railways. About **40 million tonnes** of food grains are transported by FCI across the country in a year.
- Movement of food grains is undertaken by rails, road and Waterways. More than **85% of the movement** of stocks is undertaken by rail.
- Inter-State movement by road is mainly undertaken in those parts of the country which are not connected by rail. Food grains stocks are also moved by **ocean vessels** to Lakshadweep and Andaman & Nicobar Islands and through coastal shipping and riverine movement to Kerala/Agartala (Tripura).

2.1. Procurement Policy for Food grains

- The Central Government extends price support to paddy and wheat through the FCI and State Agencies across the country. The procurement policy is **open ended**. Under this policy, whatever wheat and paddy are offered by farmers, within the stipulated period and conforming to the specifications prescribed by Government of India, are purchased at Minimum Support Price (MSP) by the State Government agencies including Food Corporation of India (FCI) for Central Pool.
- However, if producer/farmer gets better price in comparison to MSP, they are free to sell their produce in open market i.e. to private trader/ anyone. T
- he objective of food grains procurement by Government agencies is to ensure that farmers get remunerative prices for their produce and do not have to resort to distress sale.
- It aims to service the NFSA and other welfare schemes of the Government so that subsidised food grains are supplied to the poor and needy, and to build up buffer stocks of foodgrains to ensure foodgrain security.
- Further, the different types of coarse grains are procured by State Governments itself in consultation with FCI to the extent that the concerned State Govt. may utilise the same for distribution under National Food Security Act (NFSA) as well as Other Welfare Schemes (OWS).

Mechanism for Procurement

2.2. Centralized Procurement System

- Under Centralized Procurement System, the procurement of foodgrains in Central Pool are undertaken either by FCI directly or State Government agencies procures the foodgrains and handover the stocks to FCI for storage and subsequent issue against GOI allocations in the same State or movement of surplus stocks to other States.
- The cost of the foodgrains procured by State agencies is reimbursed by FCI as soon as the stocks are delivered to FCI as per cost-sheets issued by GOI.

2.3. Decentralized Procurement System (DCP)

- The scheme of Decentralized Procurement of foodgrains was introduced by the Government in 1997-98 with a view to enhancing the efficiency of procurement and PDS and encouraging local procurement to the maximum extent thereby extending the benefits of MSP to local farmers as well as to save on transit costs. This also enables procurement of foodgrains more suited to the local taste.
- Under this scheme, the State Government itself undertakes direct purchase of paddy/rice and wheat and also stores and distributes these foodgrains under NFSA and other welfare schemes.
- The Central Government undertakes to meet the entire expenditure incurred by the State Governments on the procurement operations as per the approved costing. The Central Government also monitors the quality of foodgrains procured under the scheme and

reviews the arrangements made to ensure that the procurement operations are carried smoothly.

Student Notes:

Open Market Sale Scheme

In addition to maintaining buffer stocks and for making a provision for meeting the requirement of the National Food Security Act (NFSA) and Other Welfare Schemes (OWS), the Food Corporation of India (FCI) on the instructions from the Government sells excess stocks out of Central Pool through Open Market Sale Scheme (Domestic) in the open market from time to time at predetermined prices to achieve following objectives:

- To enhance the supply of food grains during the lean season and deficit regions,
- To moderate the open market prices,
- To offload the excess stocks,
- To reduce the carrying cost of food grains.

3. Agriculture Marketing

- Agricultural marketing primarily concerns with the buying and selling of agricultural products. It refers to **all the activities, agencies and policies involved** in the procurement of farm inputs by the farmers and the movement of agricultural produce from the farms to the consumers.
- The **National Commission on Agriculture** defined agricultural marketing as a "**process which starts with a decision to produce a saleable farm commodity and it involves all aspects of market structure of system, both functional and institutional, based on technical and economic considerations and includes pre and post- harvest operations, assembling, grading, storage, transportation and distribution"**.
- The **Indian council of Agricultural Research** includes **three important functions** involved in agricultural marketing**, namely**
  A. **assembling** (concentration)
  B. **preparation for consumption** (processing) and
  C. **distribution**.

3.1. Significance of Agriculture Marketing

- **Monetizing the Produce**: Marketing facilitates and improves the sale of agricultural products. The value of these products is factored by the demand and supply status, which in turn is impacted by the marketed volume and the asking price. Also, a well-developed marketing infrastructure and efficient marketing system **promote competitive trade** resulting in better price realization for the farmer.
- **Acting as a source of market information and price signal:** The information from the marketing plays crucial role to empower the producers capable of producing marketable surplus. It provides them with **relevant demand linked information** on quantity, desired quality, standards and specifications of the produce. It provides **information that helps the supply chain** to become efficient by indicating **logistical and infrastructural weaknesses** such as post-harvest and storage losses.
- **Reducing the role of intermediaries:** An efficient marketing chain progressively decreases the number of hands agricultural produce changes both for economic and qualitative reasons. In such a scenario, role of intermediaries is replaced by institutional mechanisms or market structures.
- **Capital formation and investment in technology**: Effective agricultural marketing can appropriately showcase the growth potential in the sector. This will encourage investment and penetration of better technologies in the sector.
- **Value addition in agriculture:** Robust marketing systems **provide access of agricultural produce** to downstream industries, creating a potential for large scale value addition. For

Student Notes:

example, large scale 'Makhana' snack industry has been developing in the recent past after marketing initiatives were taken by Bihar Government.

Apart from above, well-functioning markets can drive growth, ensure food security, employment and economic prosperity in rural areas of the country via the agricultural sector.

3.2. Types of Agricultural Marketing in India

a) Traditional Marketing Methods

- Under this methods, the produce is directly sold by the farmers and a number of intermediaries are involved in the process
- Close to 50% of the agricultural produce in India is sold via these channels. This method is mostly used by small and marginal farmers.
- In this method, the farmer gets only 15-20 % of the price paid by the final consumers.

b) Cooperative Marketing Method

- In this method, agriproducts are directly purchased from farmers through marketing network of NAFED, thus eliminating middlemen.
- There have been various successful copperative marketing models like Anand Pattern Cooperatives (APC), Chicory Contract farming Coordination in Jamnagar and Kerala Horticulture Development Program (KHDP).

c) Emerging Models of Agri Marketing

- **National Agriculture Market (eNAM):** It is an online trading platform for agricultural commodities in India. The market facilitates farmers, traders and buyers with online trading in commodities. The market is helping in better price discovery and providing facilities for smooth marketing of their produce.
- **Farmer Producer Organizations (FPO):** It is a legal entity formed by primary producers, viz. farmers, milk producers, fishermen, weavers, rural artisans, craftsmen. It can be a producer company, a cooperative society or any other legal form which provides for sharing of profits/benefits among the members.
- **Contract Farming:** It is a form of agricultural production carried out according to an agreement between a buyer and farmers, which establishes conditions for the production and marketing of a farm product or products.
- **Commodity and Future Market:** Future trading has also been allowed to protect the market participants from the risk arising out of adverse price fluctuations. There is a three-tier regulatory structure for conduct of futures trading. At the base level, there are recognized/registered commodity associations/exchanges. At the middle level, SEBI (after merger of FMC with SEBI) regulates the functioning of commodity exchanges and approves their constitution and byelaws. The Department of Consumer Affairs, Ministry of Consumer Affairs, Food and Public Distribution, Government of India is at the top level, which oversees the overall functioning of the forward and futures markets.

3.3. Regulation of Agricultural Marketing

Agriculture is a **'state'** subject. Therefore, numerous mandis under various APMC laws of states exist where **first sale of notified commodity** happens. Also, there are several central government organisations, who are involved in agricultural marketing like, Commission of Agricultural Costs and Prices, Food Corporation of India, Cotton Corporation of India, Jute Corporation of India, etc. There are also specialised marketing bodies for rubber, tea, coffee, tobacco, spices and vegetables.

Objectives of Regulated Marketing:

- To **prevent exploitation of farmers** by helping them overcome the handicaps in the marketing of their produce through ensuring correct weighment of produce, prompt payment to the farmers, etc.

- To make the marketing system effective and efficient so that **farmers may get remunerative prices** for their produce and the goods are **made available to consumers at reasonable cost**.
- **Elimination** of the **unhealthy and unscrupulous practices**, reducing marketing costs, and providing facilities to the producer-seller in the market.
- To provide **incentive prices to farmers** for inducing them to **increase the production both in terms of quantity and quality**.
- To promote an **orderly marketing of agricultural produ**ce by improving the infrastructure facilities.

There are thousands of rural periodic markets, such as "haats", and more than 7000 government regulated APMCs, besides initiatives of numerous cooperative development, and private corporate sector that engage with farmers directly or indirectly. The government has also played an important role in **price stabilization through market intervention**. Numerous rules and regulations related to **food safety, transportation, weights and measures, food standards**, and so on were also brought in to protect interests of producers and consumers. However, over the last one or two decades, **newer needs such as increasing volumes of output, greater horticultural production, price disparity across markets have compelled a review of the APMC system**.

The Ministry of Agriculture and Farmers' Welfare made attempts to overhaul the regulatory system by proposing the **Model APMC Act, 2003** and **Model State/UT Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act, 2017**. Notwithstanding some reluctance on the part of different State governments, there now seems to be a consensus that agricultural marketing needs to be reformed and liberalized.

3.4. Agricultural Produce Marketing Committee (APMC)

Agricultural Produce Market Committee (APMC) is a **statutory market committee** constituted by a State Government in respect of trade in certain notified agricultural or horticultural or livestock products, under the Agricultural Produce Market Committee Act issued by that state government.

APMCs are intended to be responsible for:

- ensuring transparency in pricing system and transactions taking place in market area;
- providing market-led extension services to farmers;
- ensuring payment for agricultural produce sold by farmers on the same day;
- promoting agricultural processing including activities for value addition in agricultural produce;
- Publicizing data on arrivals and rates of agricultural produce brought into the market area for sale; and
- Setup and promote public private partnership in the management of agricultural markets

There are about 2477 principal regulated markets based on geography (the APMCs) and 4843 sub-market yards regulated by the respective APMCs in India.

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.

Major Issues Involved in functioning of APMCs

- Under the APMC Regulation, no exporter or processor could buy directly from the farmers, thereby discouraging processing and export of agri-products. This creates a monopsony (a market situation where there is only one buyer who then exercises control over the price at which he buys) situation.

Student Notes:

- Due to above situation of monopsony produce is procured at manipulatively discovered price and sold at higher price, defeating the very purpose of APMCs.
- Markets are overly-regulated leading to lot of corruption and exploitation of farmers.
- Fragmented markets, multiple levy of license fees, limited licenses, late payment for the purchase, unavailability of amenities and services such as facility for grading, storage etc. actually act as an impediment to the cause of farmers rather than benefitting them.
- Only State Govt. could set up markets, thereby preventing the private sector from setting up markets and investing in marketing infrastructure.
- APMCs play dual role of regulator and Market. Consequently, their role as regulator is undermined by vested interest in lucrative trade. Generally, member and chairman are nominated/elected out of the agents operating in that market.

3.5. Model APMC Act, 2003

An efficient agricultural marketing is essential for the development of the agriculture sector as it provides outlets and incentives for increased production and contribute to the commercialization of subsistence farmers. Worldwide Governments have recognized the importance of liberalized agriculture markets. Keeping, this in view, Ministry of Agriculture formulated a model law on agricultural marketing - **State Agricultural Produce Marketing (Development and Regulation) Act, 2003** and requested the state governments to **suitably amend their respective APMC Acts for deregulation of the marketing system in India**, to promote investment in marketing infrastructure, thereby motivating the corporate sector to undertake direct marketing and to facilitate a national market.

The Model APMC Act, 2003 provided for the **freedom of farmers to sell their produce**. The farmers could sell **their produce directly to the contract-sponsors or in the market set up by private individuals, consumers or producers**. The Model Act also increases the competitiveness of the market of agricultural produce by allowing **common registration of market intermediaries**.

Salient Features of the Model APMC Act

- The Preamble of the Act calls for development of **efficient marketing system**, promotion of **agri-processing and agricultural exports** and to lay down **procedures and systems for putting in place an effective infrastructure** for the marketing of agricultural produce.
- Legal persons, growers and local authorities are permitted to apply for the **establishment of new markets** for agricultural produce in any area. Consequently, in a market area, more than one market can be established by private persons, farmers and consumers.
- There will be **no compulsion on the growers to sell their produce** through existing markets administered by the Agricultural Produce Market Committee (APMC). However, agriculturist who does not bring his produce to the market area for sale will not be eligible for election to the APMC.
- Separate provision is made for notification of '**Special Markets' or 'Special Commodities Markets'** in any market area for specified agricultural commodities to be operated in addition to existing markets.
- A new Chapter on '**Contract Farming**' added to provide for compulsory registration of all contract farming sponsors, recording of contract farming agreements, resolution of disputes, if any, arising out of such agreement, exemption from levy of market fee on produce covered by contract farming agreements and to provide for indemnity to producers' title/ possession over his land from any claim arising out of the agreement
- Provision made for **direct sale of farm produce to contract farming sponsor** from farmers' field without the necessity of routing it through notified markets.
- Provision made for imposition of **single point levy of market fee** on the sale of notified agricultural commodities in any market area and discretion provided to the State Government to fix graded levy of market fee on different types of sales.

Student Notes:

- **Licensing of market functionaries is dispensed with** and a **time bound procedure for registration** is laid down. Registration for market functionaries provided to operate in one or more than one market areas.
- Provision made for the establishment of **consumers'/farmers' market** to facilitate direct sale of agricultural produce to consumers
- Provision made for **resolving of disputes**, if any, arising between private market/ consumer market and Market Committee.
- State Governments conferred power to exempt any agricultural produce brought for sale in market area, from payment of market fee.
- Market Committees permitted to use its **funds** among others to create facilities like grading, standardization and quality certification; to create infrastructure on its own or through public private partnership for post harvest handling of agricultural produce and development of modern marketing system.
- The **State Agricultural Marketing Board made specifically responsible** for:
  - setting up of a separate marketing extension cell in the Board to provide market-led extension services to farmers;
  - promoting grading, standardization and quality certification of notified agricultural produce and for the purpose to set up a separate Agricultural Produce Marketing Standards Bureau.
- **Funds of the State Agricultural Marketing Board** permitted to be utilized for promoting either on its own or through public private partnership, for the following:
  - Market survey, research, grading, standardization, quality certification, etc.;
  - Development of quality testing and communication infrastructure.
  - Development of media, cyber and long distance infrastructure relevant to marketing of agricultural and allied commodities.

Criticisms of Model APMC Act

The Model APMC Act does not go far enough to create a national or even state level common market for agriculture commodities. The Act retains the mandatory requirement of the buyers having to pay APMC charges even when the produce is sold directly outside the APMC area. Though the Model Act provides for setting up of markets by private sector, this is not adequate to create competition even within the state since the owner will have to collect fees/taxes on behalf of the APMC in addition to their own charges.

3.6. Model Agricultural Produce and Livestock Marketing (Promotion & Facilitation) Act, 2017

The Government of India brought in a new draft model law**, Agricultural Produce and Livestock Marketing (Promotion and Facilitating) Act (APLM), 2017** to replace the **Agriculture Produce Markets Committee Act, 2003.**

Objectives

- To create a **single agri-market** where with single licence one can trade agri-produce as well as livestock.
- Better **price realization** for farmers.
- **Doubling farmer's income** by 2022.

Major Provisions of the Draft Model Act

- **Intra-state trade** made available by paying a single fee.
- Traders will be able to sell perishables like fruits and vegetables outside existing mandis (wholesale markets).
- The draft law proposes to **cap market fees and commission charges payable by a farmer** after bringing produce to a wholesale market.

Student Notes:

- Cap on levy of market fees is proposed at 2% (of sale price) for fruits and vegetables and 1% for food grains.
- Warehouses and cold storages are to act as regulated markets.
- All **regulatory powers will lie with the office of the director of agricultural marketing** in the state, who will also issue licenses to traders and new private players. As of now, this power lies with the mandis – managed by a board of directors.
- Farmers can directly sell their produce to bulk buyers.

Significance

- It will lead to a **barrier-free unified agricultural market** with one trader licence (interstate trading licence).
- It will allow private players to set up wholesale markets thereby breaking the monopoly of traditional 'mandis'.
- Increased competition among buyers will lead to **better farm-gate prices.**
- The new law will also **reduce wastage of farm produce.**
- Promotion of **electronic trading.**

3.7. Issues pertaining to Agriculture Markets in India

Institutional Issues:

- **Licensing Barriers:** The compulsory requirement of owning a shop/godown for getting license as commission agents/traders has led to the monopoly of certain licensed traders. This acts as a major entry barrier in existing APMCs for new entrepreneurs, thus, creating cartelization and preventing competition.
- **High Incidence of Market Charges**: APMCs are authorized to collect market fee ranging between 0.5% to 2.0% of the sale value of the produce. Further, other charges, such as, purchase tax, weighment charges etc. are also required to be paid. In some States, this works out to **total charges as large as 15 %.**
- **Absence of standardized grading mechanism** of agricultural produce before it is sold. It hinders farmers from fetching the prices commensurate with the quality of their produce.

Infrastructural Issues:

- **Poor Infrastructure in Agricultural Markets**: Studies indicate that covered and open auction platforms exist only in two-thirds of the regulated markets, while only one-fourth of the markets have common drying yards. Cold storage units exist in less than one tenth of the markets and grading facilities in less than one-third of the markets.
- **Poor economic viability of projects**: Agriculture marketing infrastructure projects have a long gestation period. The seasonality and aggregation of small surpluses of agricultural produce further affects the economic viability of the projects, which deters investments.

Market information system issues:

- **Lag in demand signals**: Absence of efficient real-time informational channels create a lag in demand signals. This has resulted in farmers following price trends as indicators to supply. Presently, price is a measure that is post-circumstantial and these circumstances may not repeat next season.
- **Limited information channels and content:** The current information dissemination systems, (like local newspapers and APMC display boards) provide information only on prices of major commodities, are far away from farmer's location and generally not available in local languages.

Student Notes:

- **Poor awareness about new channels of information:** Only a small fraction of farmers use the more accessible SMS based advisories or Voice interactive systems.

Other issues:

- **Absence of a National Integrated Market**: Although, there exists a national level physical market in the form of APMCs, there is no national level regulation for the same and the existing regulations do not provide for a barrier free market in the country.
- **Limited public investment:** Public expenditure on agricultural marketing sub-sector ranges 4-5 % of the total public expenses on agriculture, while expenditure on marketing infrastructure development has been less than 1 %.

The collective result of these issues has been **low price realization for farmers**, creation of **food and nutritional insecurity** and **high wastages in the supply chain**.

3.8. Recent Government Measures to improve Agricultural Marketing in India

1. The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020
2. The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020
3. The Essential Commodities (Amendment) Act, 2020
4. **Agricultural Produce and Livestock Marketing (Promotion and Facilitating) Act, 2017**
5. Model APMC Act, 2003
6. **AGMARKNET**: It is a G2C e-governance portal that caters to the needs of various stakeholders such as farmers, industry, policy makers and academic institutions by providing agricultural marketing related information from a single window.
7. **Gramin Agricultural Markets (GrAMs):** Efforts are being made to develop and upgrade existing 22,000 rural haats (Rural Primary Markets) into GrAMs. It will be linked to e-NAM and will remain outside the APMC Act regulation.
8. **Scheme for Formation and Promotion of Farmer Produce Organizations (FPOs):** The scheme aims to create 10,000 FPOs in five years period from 2019-20 to 2023-24 and also provide handholding support to each FPO.

4. Way Forward

1. **NITI Aayog Recommendation:** NITI Aayog has identified key reforms required in state APMC acts and is now persuading states to undertake certain reforms. These reforms include:
   I. Provision for **e-trading, unified trading license and a single point levy** of market fee
   II. Set up markets in the private sector (**private mandis) and direct marketing** to reduce the intermediaries between producer and buyer.
   III. States advised to **relax the felling and transit rules for trees** grown by farmers on their own lands to encourage agroforestry for supplementary income.
   IV. **Liberalize land lease market –** Niti Aayog has already brought up a model Land leasing law for the same.
   V. **Take fruits and vegetables out of APMC Act.**
   VI. Delink **provisions of compulsory requirement of space** for registration of traders.
2. **Integration of Domestic Markets with International Markets**: The barriers in free marketing across different states especially for foodgrains should be dismantled. This calls for dismantling of restrictions on pricing, trading, distribution and movement of agricultural products within the country. Further, India, being a signatory to the World Trade Organisation (WTO) Agreement, should do away with physical barriers, both for imports and exports, on various agricultural commodities. Simultaneously, it should reduce tariff barriers within a time frame. These steps could facilitate the integration of domestic markets with international markets in due course.

Student Notes:

3. **Strengthening Co-operative Marketing Societies**: The progress made by co-operative marketing societies so far, though noteworthy, is not wholly satisfactory. Co-operatives have yet to cover a substantial part of the total agricultural produce. It is, therefore, essential that these co-operatives develop at a faster speed and along right lines. Marketing societies need to be more closely intertwined with other societies dealing with farming inputs, credit, etc. The best way to do so is to establish multipurpose societies to look after all the aspects of agricultural marketing. These societies, apart from organizing the sale of agricultural produce, should undertake construction of their own storage capacity, provide for their own transport, arrange for the processing of produce, grade their goods, organize exports, etc. This will reduce their dependence on other sources and provide a total view of marketing services to the members.
4. **Strengthening of Regulated Market Structure**: The management of regulated markets is entrusted to agricultural produce marketing committees (APMCs) on which different interests are represented. There is an urgent need to make these market committees viable and managerially competent in keeping with liberalized trade atmosphere. The market committees should be headed by marketing professionals. Further, the present number of regulated markets is not enough to meet the growing requirements of the country. There is also an urgent need to develop rural periodic markets in a phased manner with necessary infrastructural amenities to have a strong grass-root level link in the marketing chain.
5. **Re-framing Price Stabilization Policy**: With a view to provide remunerative price to the farmer, food at affordable price to the consumer and sustained growth of marketable surplus, all undesirable restrictions on agricultural trade has to be removed. Public procurement, storage and distribution of foodgrains need to be managed efficiently on commercial lines.
6. **Developing Efficient Commodity Futures Markets**: In order to strengthen the future market Government should set up more commodity exchanges, improve the regulatory and supervisory systems, modernize clearing house operations, upgrade training facilities and establish an enabling legal framework to develop vibrant commodity futures market in India.
7. **Promoting Direct Marketing**: Rythu Bazaars in Andhra Pradesh, Apni Mandis in Punjab & Haryana and Uzavar Santhaigal in Tamil Nadu have shown success. In direct marketing, the market operates outside the purview of Agricultural Produce Marketing Act and will be owned by professional agencies, such as wholesalers, trade associations, NGOs or self-help groups (SHGs). Promotion of direct marketing as one of the alternative marketing structures is beneficial for the farmers as well as the buyers as it enables the former to meet the specific requirements of the latter. Direct marketing enables farmers and buyers to economize on transportation costs, handling charges, market fees, etc., to improve price realization considerably.
8. **Improving Transport Infrastructure**: The traditional rural transport system should be improved. The public investments in the road, railway and waterways should be developed.
9. **Improving Storage Facility**: The private sector needs to be encouraged to enter the warehousing and storage in a big way by extending proper incentives to it. Experiment of the creation of decentralised rural godowns also needs to be pursued more vigorously. Village Panchayats, co-operatives, SHGs, farmers organisations, NGOs, etc., should also be encouraged to undertake warehousing activity under the scheme. In case of perishable commodities like fruits, vegetables and flowers, the complete cold chain comprising pre-cooling, grading, packaging, cold storage and refrigerated vans should be developed.
10. **Providing Processing, Packaging and Grading Facilities**: Proper cleaning, grading and packaging of primary products will need greater attention not only in the physical markets, but also in the villages from where produce is brought to the market for sale. Besides, there is a need to educate the farmers for proper grading and packaging before they bring the produce to the market. In the changed context, new technologies of packing like tetra packs, ascetic packing, pouches, etc. need to be introduced.

11. **Making Available Credit for Marketing**: Provision of credit by the organized financial system to support agricultural marketing has to grow further. Considerable amount of institutional financing for agricultural marketing is directed towards public organizations. The credit facility available to private traders is quite limited.
12. **Promoting Agricultural Marketing Research**: The agricultural marketing research in the areas of agri-business management, post-harvest management, grading, standardization, quality assurance, export promotion and information technology should be promoted. The agriculture research institutes and universities should be further strengthened to undertake applied and operational research in agricultural marketing, impart training to market functionaries and provide consultancy services to the public as well as private organizations engaged in agricultural marketing. Further, conferences, seminars, and workshops should be conducted from time to time on current and relevant issues to facilitate exchange of views among various market functionaries.

5. Farm Acts 2020

In September, 2020 the President of India gave assent to three farm bills that aims to reform restructure agriculture sector in India.

5.1. The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020

Key features of the act

- **Trade of farmers' produce:** The Act allows intra-state and inter-state trade of farmers' produce outside: (i) the physical premises of market yards run by market committees formed under the state APMC Acts and (ii) other markets notified under the state APMC Acts.
- **Electronic trading**: It permits the electronic trading of scheduled farmers' produce (agricultural produce regulated under any state APMC Act) in the specified trade area.
    - An electronic trading and transaction platform may be set up to facilitate the direct and online buying and selling of such produce through electronic devices and internet.
    - The following entities may establish and operate such platforms: (i) companies, partnership firms, or registered societies, having permanent account number under the Income Tax Act, 1961 or any other document notified by the central government, and (ii) a farmer producer organization or agricultural cooperative society.
- **Market fee abolished**: The Act prohibits state governments from levying any market fee, cess or levy on farmers, traders, and electronic trading platforms for trade of farmers' produce conducted in an 'outside trade area'.

5.2. The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020

Key features of the act

- **Farming agreement**: The Act provides for a **farming agreement between a farmer and a buyer** prior to the production or rearing of any farm produce.
    - The minimum period of an agreement will be one crop season, or one production cycle of livestock. The maximum period is 5 years, unless the production cycle is more than 5 years.
- **Pricing of farming produce**: The price of farming produce should be mentioned in the agreement. For prices subjected to variation, a guaranteed price for the produce and a clear reference for any additional amount above the guaranteed price must be specified in the agreement.
    - Further, the process of price determination must also be mentioned in the agreement.

Student Notes:

- **Dispute Settlement**: A farming agreement must provide for a conciliation board as well as a conciliation process for settlement of disputes. The Board should have a fair and balanced representation of parties to the agreement.
    - At first, all disputes must be referred to the **board for resolution**. If the dispute remains unresolved by the Board after thirty days, parties may approach the Sub-divisional Magistrate for resolution. Parties will have a right to appeal to an Appellate Authority (presided by collector or additional collector) against decisions of the Magistrate.
    - Both the Magistrate and Appellate Authority will be required to dispose of a dispute within **thirty days** from the receipt of application**.** The Magistrate or the Appellate Authority may impose certain penalties on the party contravening the agreement. However, **no action can be taken against the agricultural land of farmer for recovery of any dues.**

5.3. The Essential Commodities (Amendment) Act, 2020

Key features of the act

- **Regulation of food items**: The Act provides that the central government may regulate the supply of certain food items including cereals, pulses, potatoes, onions, edible oilseeds, and oils, only under extraordinary circumstances. These include: (i) war, (ii) famine, (iii) extraordinary price rise and (iv) natural calamity of grave nature.
- **Stock limit**: The Act requires that imposition of any stock limit on agricultural produce must be based on price rise. A stock limit may be imposed only if there is: (i) a 100% increase in retail price of horticultural produce; and (ii) a 50% increase in the retail price of non-perishable agricultural food items.

5.4. Possible Benefits of the acts

The recent Agri-reform legislations can address the issues pertaining to the agriculture sectors. Some of the potential benefits are as follows:

- **Checking Monopolies:** The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020 allows intra-state and inter-state trade of farmers' produce outside the APMC controlled areas thus creating an ecosystem where the farmers and traders enjoy **freedom of choice of sale and purchase** of agri-produce. This indirectly **ends the monopoly exercised by traders and other intermediaries** within the APMCs. For example, a turmeric farmer now could sell her produce to BigBasket in Delhi, without any trader commission, at a mutually agreed upon price.
- **Idea of 'one Nation, one Agri-market': Abolition of market fee** for trade outside the designated trade area and permission for **electronic trading of agri-produce** within the designated trade area **may increase flow of agricultural produce across areas**. This would enable **farm surplus to move from surplus to deficit regions** seamlessly, thus effectively creating one national market from several fragmented markets.
- **Encouraging Private Sector participation:** The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020 provides the **legislative framework needed to boost contract farming**. This will not only encourage direct participation of private players in agricultural production but also **direct link between farmers and food processing industries.**
- **Better inventory management of Agricultural Produce:** Restrictions on hoarding of food commodities by the Government resulted in **widespread harassment of traders** and **rent-seeking behavior**. With the EC (Amendment) Act, these restrictions are limited to extraordinary circumstances, potentially leading to a more efficient inventory management system and lesser interference by authorities

Student Notes:

- Also, the Essential Commodities (Amendment) Act specifies objective criterion for imposing a stock limit. This enables the trader to **improve his/her economies of scale** and **limits the administrative discretion of regulating authorities.**
- **Improve price discovery and realization for farmers:**
  - Provisions enabling **Contract farming** will encourage groups of **growers and entrepreneurs to come together in a contractual relationship** which will provide a ready market for growers for their produce, and ready access to raw material for the entrepreneurs (sponsors). It will **transfer the risk of market unpredictability from the farmer to the sponsor**.
  - Also, it may reduce cost of marketing for farmers. Since, after signing contract, farmer will not have to seek out traders. **The purchasing consumer will pick up the produce directly from the farm.**
  - Also, **exempting selected commodities from ECA will improve the marketability of the crop** for growers.
- **Other benefits:**
  - These reforms may act as a catalyst to **attract investment for building supply chains** for supply of Indian farm produce **to national and global markets**, and in agricultural infrastructure. Also, these reforms **may accelerate growth in Cold Storage, warehouses and processing** sector.
  - The reforms may lead to increased farmer access to h**igh quality seeds, better technology, fertilizers and pesticides** along with providing **impetus to research and new technology in agriculture sector.**

5.5. Major Concerns related to the acts

- **Sudden changes** in market mechanisms are very difficult to implement and as a result may not bode well for the market. For instance, in 2006, Bihar repealed its APMC Act with an objective to attract private investment in the sector and which created issues like **poor upkeep of infrastructure** and **high transaction charges**.
- **Dual Regulation**: The legislations create an artificial distinction between "market areas"(regulated by the mandi system under state governments) and "trade areas" (now under the central Acts), thus risking a problem of dual regulatory market.
- **Impact on APMCs**: The newly created 'trade areas' would have a clear regulatory advantage over 'market areas' vis-à-vis the mandi tax. This could potentially lead to a **collapse of the APMC system** and initiatives like e-NAM which are riding on top of physical mandi structure in the country.
- **Loss of revenue for state governments:** State Governments may lose mandi tax, which is a major source of revenue for States like Punjab and Haryana.
- **Lack of methodology for price determination**: The legislation, while offering protection to farmers against price exploitation, does not prescribe the mechanism for price fixation or a methodology for regulatory oversight.
- **No recognition to verbal contracts**: According to the legislation, companies are not required to have a written contract with the farmer, making it difficult for farmers to prove terms. As a result, if a farmer gets into a dispute regarding her/his contract with a private company, it will be very difficult for the farmer to have the dispute settled in her/his favor.
- **Danger of hoarding activities**: Some experts fear that exemption of selected commodities from ECA would effectively legalize hoarding, as licenses will no longer be required to trade in these commodities. Such a situation can lead to anti-competitive behavior by particular buyers in the food chains.

Student Notes:

6. Miscellaneous Topics

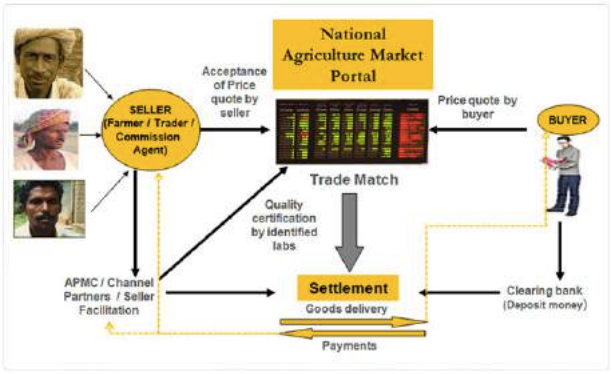
6.1. National Agriculture Market (NAM)

- NAM, announced in Union Budget 2014-15, is a **pan-India electronic trading portal**, which seeks to connect existing APMCs and other market yards to create a unified national market for agricultural commodities.
- NAM is a "virtual" market but it has a physical market (mandi) at the back end.
- Financial help to implement NAM is given to states through Agri Tech Infrastructure Fund.
- Department of Agriculture and Cooperation is implementing NAM through Small Farmers Agribusiness Consortium which acts as implementing agency.

Need to unify markets

- To ensure better prices to farmers
- To improve supply chain
- Reduce wastages
- Create a unified national market

Agriculture Market Working Model



Expected Benefits

- Increase operational efficiency and transparency in the mandi operations
- Enhance market access and more options for farmers through warehouse based sales
- Larger national market for secondary trading for the local trader in the mandi
- Reduction in intermediation costs for bulk buyers, processors, exporters etc.
- Eliminate information asymmetry
- Will lead to common procedures for issue of licenses, levy of fee and movement of produce In 5-7 years, it will result into higher returns for farmers, lower transaction costs to buyers and stable prices and availability to consumers
- It will also help in emergence of value chains by promoting scientific storage and movement of agricultural goods

6.2. Contract Farming

- Under Contract Farming, agricultural production (including livestock and poultry) can be carried out based on a **preharvest agreement** between buyers (such as food processing units and exporters), and producers (farmers or farmer organisations).
- **Benefit**: The producer can reduce the risk of fluctuating market price and demand while buyer can reduce the risk of non-availability of quality produce.
- It comes under **Concurrent List** of the Seventh Schedule of constitution; however Agriculture is under State list.
- Present laws on contract farming only include one or two farm commodities and are limited to marketing only.

Student Notes:

The Government has brought Model Contract Farming Act in 2017. Key features of the Act is shown in figure below.

Challenges with Contract Farming

- **State reluctance:** States have been reluctant to carry forward reform for the fear of loss of revenue.
- **Stockholdings limits** on contracted produce under Essential Commodities Act, 1955 are restrictive and discourage buyers to enter into contracts.
- **Lack of uniformity or homogeneity** among states law regarding kinds of produce, conditions etc. which is needed for allowing contract farming.
- **Promote Regional Inequality**: Currently it is practiced in agriculturally developed states (Punjab, TN etc.) while States with highest concentration of small and marginal farmers are not able to reap its benefit.

- **Supply side issue**: Buyers have no incentive for contract farming with a large number of small and marginal farmers (**average size of landholdings in India was 1.1 hectare (census 2011**)) due to high transactions and marketing costs, creating **socio-economic distortions** and preference for large farmers.
- **It's a capital-intensive and less sustainable pattern of cultivation** as it promotes increasing use of fertilizers and pesticides which have detrimental impact on natural resources, environment, humans and animals.
- **Encourages Monoculture Farming**: This will not only impact soil health but also possesses risk of food security and import of food grains
- It **increases dependency of farmers on corporate** for inputs, making them vulnerable.
- Predetermined prices can **deny farmers the benefits of higher prices** prevailing in market for the produce.

6.3. Agricultural Price Policy

Agriculture price has significant impact on producers and buyers of agriculture products. The agriculture price offers incentives to improve production and marketable surplus to the cultivators and affect the allocation of resources.

Nature of Agriculture Price in India

Agriculture prices depict large fluctuations and except for few years in the beginning of planning since 1951 there has been an almost continuous uptrend in the agriculture prices. The causes of such fluctuations are as follows:

1. **Dependence on Rainfall**: The production of agricultural goods is more dependent upon vagaries of nature. A good rainfall results into higher production and scarce or excessive rains/floods have an adverse impact on agricultural output. The erratic natural conditions thus give rise to the sharp variations in the agricultural output supply. These variations in the output gives rise to the large price variations.
2. **Low price Inelasticity of demand of Agricultural Goods**: The demand for agriculture goods particularly food crops don't change with the change in its price. The overproduction in agriculture leads to price crash as demand doesn't increase and under production causes prices to rise as demand doesn't fall.

Objective of Agriculture Price Policy

The stability of agriculture price is essential since the higher agriculture prices affect purchasing power of consumers and greater input cost to the industrial users. The reduction in the purchasing power of the consumer has implication on demand for industrial goods. The broad objectives of agriculture price policy in India are:

- To set remunerative prices with a view to encourage higher investment and production in the agriculture.
- To set the prices at levels so that the consumers are not adversely affected.
- Agriculture prices should be such that the terms of trade between agriculture and non-agriculture sector is not adversely affected.
- To set price in such a manner so that optimal crop mix can be achieved.

Major Instruments of Agriculture Price Policy (APP) in India

APP includes the following instruments:

- Minimum Support Price (MSP) & Procurement prices
- Buffer Stocks

A. MSP and Procurement Prices

- The price support policy was initiated by the Government to provide protection to agricultural producers against any sharp drop in farm prices. If there is a good harvest

Student Notes:

and market prices tend to dip, the government guarantees an MSP or floor price to farmers**, which covers not only the cost of production, but also ensures a reasonable profit margin for the producers**.

- MSP is announced each year and is fixed after taking into account the recommendations of the CACP (**Commission for Agricultural Costs and Prices**). CACP is an agency which advises the Government on a continuing basis about the level of MSP.
- Procurement prices are the prices of Kharif and Rabi cereals at which the grain is to be domestically procured by public agencies (for example, FCI [Food Corporation of India]) for release through public distribution services (PDS).
- Normally, the procurement price is lower than the open market price and higher than MSP. In the present system only one set of prices is announced for crops.
- While recommending the prices the CACP takes comprehensive overview of the entire structure of the economy of a particular commodity and the likely effect of the price policy on the rest of economy particularly, on the cost of living, level of wages, industrial cost structure etc.
- An important consideration underlying the price policy is that it should compensate the farmers for the increasing input cost and provide incentive to increase investment in the agriculture.
- The MSPs are normally announced upfront before the commencement of sowing operations of the particular crop and have usually been remunerative and significantly higher than the cost.

B. Buffer stocks and Public Distribution System

- Buffer stock operations are an integral component of agriculture price in India. It is used as an instrument to minimize the fluctuations in the prices of agriculture products. Buffer stocks have a price stabilizing impact on the economy.
- Under the buffer stock policy, government builds up stock of agricultural commodities either through purchases from domestic market or through imports and release these stocks in the domestic market when the prices are rising.
- The government supply thus moderates the sharp increase in the price of agricultural products. In the event of bumper crop, the market price is substantially reduced.
- In this situation government make procurements at MSP or procurement price and prevent fall in price. This helps to prevent distress sales among farmers.
- The sufficient buffer stock is required to be maintained to meet emergencies like droughts, crop failures floods and crop damages or other such calamities to prevent sharp rise in market prices.
- The public distribution system (PDS) is used to supply the buffer stock to the weaker sections. At present PDS consists of a network of 3,50,000 fair-price shops that are monitored by state governments.
- Supplying basic food commodities through PDS not only serves the purpose of reaching the needy, it also acts as a control for general consumer prices.
- FCI is the sole repository of food grains reserved for PDS. The Corporation has functioned effectively in providing price support to farmers through its procurement scheme and in keeping a check on large price increases by providing food grains through PDS.

Student Notes:

7. Previous Years UPSC Mains Questions

1. Elaborate on the policy taken by the government of India to meet the challenges of the food processing sector.
2. Examine the role of supermarkets in supply chain management of fruits, vegetables and food items. How do they eliminate number of intermediaries?
3. In view of the declining average size of land holdings in India which has made agriculture non-viable for a majority of farmers, should contract farming and land leasing be promoted in agriculture? Critically evaluate the pros and cons.
4. What are the impediments in marketing and supply chain management in industry in India? Can e-commerce help in overcoming these bottlenecks?
5. There is also a point of view that agriculture produce market committees (APMCs) set up under the state acts have not only impeded the development of agriculture but also have been the cause of food inflation in India. Critically examine.

8. Previous Years Vision IAS GS Mains Questions

1. ***"Transportation plays an important role in agricultural efficiency and production". Elaborate its importance in agricultural sector.***

Approach:

We have to explain how agricultural production, productivity and efficiency are related to transportation. Further, we need to elaborate on the backward and forward linkages of transportation with respect to agricultural processes.

Answer:

Agricultural Productivity is a quantitative term, which measures the ratio of index of agricultural outputs to that of inputs in the farm production. Therefore, it provides an estimate of farm output per unit of input. On the other hand agricultural efficiency is related to the overall viability of agricultural operations, in the sense that it is fruitful for the agriculturalist to carry on with his profession.

An efficient transport system is critically important to productivity as well as efficiency of agricultural operations. If transport services are of poor quality, infrequent, or expensive then it will turn out to be disadvantageous to the farmers. For instance, an expensive transport service will lead to low farm gate prices (the net price the farmer receives from selling his produce).

Insufficient provision of transport services especially during harvest times, low competition of service providers on rural roads, high vehicle operating costs on bad roads, inefficient vehicle operations are other factors related to transportation that act as impediments to a productive and an efficient agriculture system.

Physical availability of transport infrastructure, transport means, frequency, rate, growth and its linkages to important market destinations also affect agricultural production and efficiency. Further, the location of market and storage facility influences the choice of vehicles used in transportation.

There are yet another set of factors which affect the cost of agricultural products. These include price of fuel, fare to travel to market centers for supplying raw materials and taking services from the city centres. Thus by acting as a linkage between the core and the hinterlands, it plays a role of two way linkage.

Keeping in mind the importance of transportation in agricultural production and efficiency, certain measures like viewing all modes of transportation from a systems standpoint rather than separately, tackling funding issues etc. can be taken.

Student Notes:

2. One of the principal aims of improving agricultural marketing is to make agriculture more viable for the small farmers in India. In the above context, comment on the strengths and weaknesses of Cooperative and Contract farming in India.

Approach:

First, comment on the state of farmers in general referring to the above statement. Then, bring out the strength and weakness of the cooperative and contract farming in India.

Answer:

Owing to the small land holding size of farmers in India, with more than 85% of farmers having land holdings size less than 2 acres, it becomes increasingly difficult to make agriculture as an economic activity viable for their sustenance, lest only to provide food for the sustenance of the farmer.

Co-operative farming in broad terms refers to pooling of land and practising joint agriculture. Its goal is to bring together all of the land resources of farmers in such an organised and united way so that they will be collectively in a position to grow crops on every bit of land to the best of the fertility of the land.

Cooperative farming helps in achieving **Economies of Scale** for the small farmer. As the size of farm increases, the cost of using machinery (tube wells, tractors etc.) decreases. It further helps in solving the problem of subdivision and fragmentation of holdings. Resources can be pooled by the farmers, which can help in increasing the productivity of land and labour. Case Studies generally point out that with cooperative farming, per acre production increases.

The weakness of the above farming lies in the fact that post-independence it was mainly government driven rather than being initiated by the people themselves. Further, fear of unemployment, attachment to land, lack of proper propaganda renunciation of membership by farmers and existence of fake societies inhabited its growth in India. While there were many loopholes in the government policy, benefiting large farm owners, leading to creation of 'bogus farms', subsidy provided was also not well targeted which further lead to proliferation.

Contract Farming can be described broadly as an institutional arrangement between farm and firm to produce and transact agricultural commodities on predetermined terms. The core of contract farming arrangements is some form of commitment, oral or written, on the part of the farmer to provide a commodity of a particular quality and quantity, grown according to specified methods agreed upon before sowing, with a corresponding commitment on the part of the firm to buy that produce at a pre-fixed price.

The practice, in principle is regarded as a win-win situation for both the farmer and the buyer. The farmer gets an opportunity to link up with a buyer and fix a price even before sowing, thus offering a kind of insurance and for firms, the attractiveness of timely procurement of supplies of quality produce without having to take on the responsibility of managing cultivation on factory owned farms. Further, the direct link between firm and farm implies disintermediation or the elimination of trade-middleman, saving on transaction cost.

The chief problem stems from enforcement issue. Duping farmers of lands, non-transparent quality standards, rejecting produce arbitrarily, altering price when product is delivered, weak law enforcement and legal redressal mechanism are some of the weaknesses of the current system.

Student Notes:

3. Reviving the Farm Income Insurance Scheme could be the best tool for marginal farmers to fight falling prices of agricultural products in an increasingly globalized marketplace. Explain.

Approach:

- Briefly introduce the issue of falling prices in an increasingly globalised marketplace and its effect on marginal farmers.
- Explain Farm Income insurance scheme and how it could be the best tool for marginal farmers to fight falling prices.
- One can compare the scheme with present National Crop Insurance Programme and write about the issues in it.

Answer:

Many small and marginal farmers in India are getting low prices for their produce because of increased global production and lower demand for various commodities. The latest NSSO report highlights the increasing input costs in agriculture and the alarming increase in consumption expenditure vis-à-vis income, especially among households with less than two hectares of land holdings.

The Farm Income Insurance Scheme (FIIS), originally introduced in 2003 and withdrawn the next year, has been revived in Gujarat. The scheme's main thrust is that it tries to ensure guaranteed income by insuring the difference between the farmer's predicted income and the actual income.

It calculates the predicted income by using the product of unit area yields and prices at the district level. Any decrease in the predicted income due to yield fluctuations or market fluctuations is insured under the scheme.

By only considering yield losses from natural perils, it also ensures that farmers are incentivised to produce more, and that inefficiency in farming is not rewarded. The success of FIIS will depend on whether the government is willing to move away from the current mundane system of manual inspection and data gathering to the new era of big data and technology.

When the FIIS pilot was tried a decade ago, it proved to be premature, but the time is right now to correct some of the errors in the previous scheme and move ahead.

The concerns over reliable yield and price data in the earlier attempts can be largely eradicated using present technologies. The maturing of satellite-based yield monitoring systems, integrating agricultural markets in India, and ensuring the efficiency of commodity exchanges will remove most of the concerns that arise over the large amounts of data needed for such a revolutionary scheme.

Additionally, leveraging mobile phone penetration levels and mobile-enabled technologies can ensure the availability of real time data, and reduce the moral hazard problems that afflict current insurance schemes.

The present National Crop Insurance Programme covers prevented/ failed sowing, post-harvest losses, and losses from natural calamities on an individual basis. It is an area-based approach that covers a wide variety of food, oilseed and horticulture crops.

However, low literacy, the absence of infrastructure to measure data accurately at the farm level, and the limited penetration of formal financial credit have made the scheme inefficient, leading to reduced trust among farmers. Additionally, in the current globalised market with widely varying market prices, the scheme is unable to protect farmers against price fluctuations.

Student Notes:

4. Most rural poor are excluded from the ambit of the formal financial system, which raises their dependence on informal sources as well as exposure to financial distress. In this context, explain why formal sector lending, especially to farmers, is so limited. Also suggest some steps that need to be taken to increase access to formal credit in rural areas.2016-2-763

Approach:

- Introduce the statement by writing about ineffectiveness of formal financial system in rural areas.
- Discuss the limitation of the government's financial initiatives in rural areas.
- List the relevant remedies.

Answer:

The ratio of agricultural credit to agricultural GDP has increased from 10 per cent in 1999-2000 to around 38 per cent by 2012-13. However, the share of long-term credit in agriculture or investment credit has declined (55 % in 2006-07 to 39% in 2011-12). Moreover the following trends depict the issues with formal credit in rural sector:

- **Inequity in credit disbursed**—the share of loans above Rs.10 lakh is going up and over a quarter of the credit is advanced from urban and metropolitan branches of banks. These loans mostly cater to input dealers, agri-businesses such as food and agro-processing industries and warehousing companies.
- **Steady share of informal sector** in loans to agricultural households (around 40% between 2003 and 2013).
- **The declining share of small loans (less than 2 lakh)**.
- **March Phenomenon**-banks lent over 46% of agricultural credit between January and March— perhaps to meet year-end targets —although farm loans are most likely required before the crop season begins, around June and November.

Reasons for limited formal nature of credit to farmers

- Banks' reluctance to lend to small farmers which is further accentuated by **inherent risks (say, deficit or unseasonal rains)** associated with farming. Partly, the decline could also be due to **rising costs of cultivation, inflationary pressures, and more people moving out of farming**
- A large share of credit has channelized through **non-bank financial intermediaries without collateral;** in contrast to commercial banks, which requires collateral. But they charged higher rate of interest and resorted to coercive practices (example: microfinance crisis in Andhra Pradesh. The credit disbursed by MFIs has not resulted in raising agricultural productivity because these loans require regular monthly repayments and regular meeting and oversight on borrowers)
- **A part of credit under priority lending and interest subvention scheme being diverted to agribusiness, input dealers etc.**
- High cost of disbursing loans in rural areas and mandated interest rates being too low under various schemes.
- Rural branches have declined to 37% of total branches from 54% in 1994.

Steps required to be taken

- **Priority Sector Lending Certificate (PSLCs):** it will provide a market-driven incentive for efficiency, will enable banks to sell their surplus lending and thus earning a premium for their efficiency/geographical spread. RBI has already issued instructions on trading in Priority Sector Lending Certificates in April this year.
- **Popularising Negotiable Warehouse Receipts (NWRs):** The small and marginal farmers with Kisan Credit Cards (KCCs) can also avail the benefit of interest

Student Notes:

subvention scheme extended for a further period of up to six months (post-harvest) against Negotiable Warehouse Receipts (NWRs) at the same rate as available to crop loan to discourage distress sale of corps by small farmers.

- **Creating Big-sized banks:** which unlike smaller ones, have the ability to cross-subsidize their stakeholders. Former RBI deputy governor K.C. Chakrabarty has highlighted the importance of big banks in improving allocation efficiency between rural and urban areas.
- The government may consider **removing the subvention restrictions** on interest rates. Then banks would be free to set interest at rates that cover their costs and it would make loans viable.
- The bank may **channel credit through non-bank intermediaries** such as MFIs and allow the MFIs to charge rate of interest above the rate charged by banks.
- There should be **provisioning for delivering institutional credit to poor farmers without collateral.** It may lead to increased credit availability to rural poor.
- **Banking correspondents** need to be appointed and adequately incentivized with commissions linked to loan repayments.
- There is also a need to **incentivize the financial institutions** to provide farmers with credit.

5. Discuss the causes and consequences of lack of a common market in Indian agriculture. How can implementation of the National Agriculture Market help in addressing the issues involved?

Approach:

- First briefly define common agriculture market.
- Explain the causes of lack of a common market.
- Explain the consequences of lack of a common market.
- Point out ways in which National Agriculture Market would improve marketing and promote efficiency.

Answer:

A common agriculture market is one wherein there is seamless movement of agriculture goods across districts and state borders, requiring only one license to trade and doing away with intermediate transaction costs.

India has a fragmented agriculture market because of following reasons:

- **APMC Act:** It has led to development of mandis with middlemen leading to fragmentation.
- **Differences in remoteness and connectivity**: some agri regions are well connected while others are isolated even lacking roads
- **Local market power of intermediaries**: concentration of power in few hands leading to abuse by intermediaries of mandis. They are averse to any reform.
- **Disinterest of states**: Since Mandis are source of revenue for states they are not interested in diluting them.
- **Exposure to shocks**: shocks affect regular supply chain hampering dependency
- **Poor storage and supply chain**: Limited storage capacity, inadequate mandi infrastructure and poor transportation facility.
- Multiple taxes across trade.

Student Notes:

Lack of a common market results in harm to producers, traders, processors, consumers, etc.:

- **Inadequate competition**: fragmentation leads to requirement of licenses for each mandi by traders hampering adequate participation leading to lack of specialization in subsectors.
- **Inefficient resources allocation**: most of the money is spent on paraphernalia equipment thus denying resources for core activity performance.
- **Large number of intermediaries**: denying price benefits to producers, processors and consumers.
- Low cost for producers, high cost for consumers.
- Greater exposure to travesty of natural shocks, crop failures etc.

National Agriculture Market is a pan-India electronic trading portal which seeks to network existing mandis and other market to create a unified national market for agricultural commodities. NAM is a "virtual" market but it has a physical market (mandi) at the back end. It will help in improving marketing and promoting efficiency in following ways:

- **Increase in competition**: producer can either sell to local traders or online, more trades even from other states can participate by having only one license per trader.
- **Reduction in cost** and **post-harvest losses**: reduction in the number of intermediaries, single levy of transaction cost, assured sales etc. would lower the cost and reduce losses
- **Facilitate emergence of integrated value chains** in major agricultural commodities across country and help to promote scientific storage and movement of agri-commodities.
- Efficient resource allocation.

eNAM would lead to **One Nation – One Market** and this is an important step towards doubling farmers' income in the next five years.

6. Despite being amongst the top agricultural producers, there exists a huge gap between production and availability of food grains and vegetables in India. Analyse the reasons for the same with special focus on post-harvest losses. Also enumerate the steps taken by the government to address the problem.

Approach:

- Introduce the given statement by substantiating some key facts.
- Discuss the reasons including supply chain problems which cause wastage.
- Mention the steps of the government in this regard.

Answer:

India's is the world's largest producer of milk, many fruits and vegetables, and some staples. In recent years India has achieved a record production in food grains. It is favoured by a vast geographical area supported by varied climatic conditions.

Even though India has enough food it is home to about 25 percent of the world's hungry poor. The per capita availability of food grains, fruits and vegetables, vis-a-vis production, is quite low.

Student Notes:

Table 4: Per capita Availability and Deficit of other than food grains

Food Items	Per capita availability	ICMR recommendations for Indians	Per capita deficit
Milk	246 grams/day	250 grams/day	06 grams/day
Egg	42 eggs/annum	180 eggs/annum	138 eggs/annum
Vegetables	179 grams per day	300 grams per day	121 grams per day
Fruits	58 grams per day	92 grams per day	34 grams per day

The Per capita amount of food available is typically calculated as production plus imports minus exports divided by the population.

Reasons for the low per capita availability

- **Poverty**: India is a hugely demand-constrained economy due to poor purchasing power reflecting poor access to nutritious food despite high production.
- **Exports**: When demand is low, an increase in local production need not translate into increased availability as a larger portion of the produce may be exported.
- **Government stocks**: Huge public stocks have been built up, foregoing consumption. The food in these stocks is deteriorating because of poor management, reducing availability.
- Huge leakages in **Public Distribution System**
- **Post-Harvest losses:** Around 25-30% of the production is wasted which means the inefficient utilisation of production and lowering of its availability.
- **Absence of a unified Agricultural market** which creates wide differentials in prices for the same commodity in different regions**.** It also leads to sharp seasonal variation of prices.

These higher levels of post-harvest losses are caused by the following:

- **Inefficient supply chain** for the distribution of the fruits and vegetables because of several problems:
  - Numerous stake holders working in isolation
  - Absence of demand forecasting
  - Absence of application of technology improvements
  - Lack of system integration
  - Presence of large number of unorganized retailers
- **Improper bagging** without crating,
- Lack of **temperature controlled vehicles** and **cold chain facilities**. According to research, approximately only 10% of the fruits and vegetables produced in India use cold storage
- Unavailability of enough **processing facilities** for the agricultural produce
- Lack of **vertical integration** of production with processing.

The government has adopted multi-pronged strategy to improve food availability in India:

- **Increase production** through various programmes such as Rashtriya Krishi Vikas Yojana, ISOPOM etc.
- **Increasing purchasing power** through welfare measures such as MGNREGA, NSAP etc.
- **Reducing leakages** by improving PDS through Aadhaar and Direct Benefit Transfer.
- **Rationalising buffer stocks**
- **E-NAM-** pan-India electronic trading portal which networks the existing APMC mandis to create a unified national market for Agriculture.

Student Notes:

- **Model APMC act** and exclusion of fruits and vegetables from the purview of State APMC act by certain states.

Several steps have also been taken to reduce post-harvest losses:

- Scheme for Development of Infrastructure for Food Processing having components of Mega Food Parks, Integrated Cold Chain, Value Addition and Preservation Infrastructure and Modernization of Abattoirs
- Scheme for Quality Assurance, Codex Standards, Research & Development and Other Promotional Activities.
- Central Sector Scheme of Cold Chain, Value Addition and Preservation Infrastructure
- Various departments and ministries are providing assistance for setting up cold storages under different schemes.

Heartiest Congratulations to all successful candidates

7 IN TOP 10 SELECTIONS IN CSE 2019

FROM VARIOUS PROGRAMS OF VISION IAS

9 IN TOP 10 SELECTION IN CSE 2018