

3.Agriculture, marketing, food security and food processing

Budget 2019-20

Pradhan Mantri Matsya Sampada Yojana to establish robust fisheries management framework to address critical gaps in value chain

Dairying through Co-operatives to be encouraged by creating infrastructure for, milk procurement, processing and marketing

Creation of **10000 new Farmer Producer Organizations** to ensure economies of scale for farmers over next 5 years

Innovative pilots of **“Zero Budget Farming”** to be replicated across the country for doubling farmers income

Examples

1. **Mission Kakatiya** -- Restoring minor irrigation sources of water with community participation. **Pani Panchayat** -- Orissa.
2. Traditional irrigation techniques such as **Tankas, khadins, vav, ahar pynes** are significant in areas such as arid and semi-arid regions.

Modernising Agriculture

1. The **existing yield levels of a majority of crops** remains much lower than the world average.
2. **Current situation**
 1. **Staple crops** (cereals, pulses and oilseeds) **occupy 77 percent of the total gross cropped area (GCA)** but contribute only **41 percent to the output** of the crop sector. High value crops (HVCs) contribute an almost similar amount to total output as staples do, but they occupy only 19 per cent of the GCA.
 2. **Low irrigation**. Close to 53 percent of cropped area is water stressed. Rainwater management practices and services are resource starved. This limits a farmer's capacity to undertake multiple cropping and leads to inefficient utilization of land resources.
 3. **Low quality seeds**.
 4. Use of **outdated and inappropriate technology** is the main reason for low productivity of crops and livestock. **Knowledge deficit** about improved **agricultural practices**. Given the pre-dominance of **small and marginal farmers** in Indian agriculture, affordability becomes a significant constraint on **technology adoption** by farmers.
 5. **Inefficient extension delivery systems** have led to the presence of large yield gaps as well. **Agricultural research** in the country is constrained by resource inadequacy, regulations and intellectual property rights (IPR).
 6. **On-farm adoption** of technology developed in public sector also has many challenges.
3. **Way forward**
 1. **Increase area under irrigation**.
 2. **Investment subsidies for micro-irrigation**: Rather than power and water subsidies, investment subsidies for micro-irrigation can be provided through the DBT mode.
 3. Increase adoption of **hybrid and improved seeds**. Strengthen seed testing facilities.
 4. Efficient **fertilizer usage**. The current lopsided fertilizer subsidy policy needs to bring secondary and micronutrients on the same

nutrient-based subsidy (NBS) platform as phosphorus (P) and potash (K). **Provide subsidies on liquid fertilizers.** Targeted subsidy should be provided on liquid fertilizers to **encourage fertigation** with micro-irrigation. Regulate **pesticide use**.

5. Custom hiring centres: Madhya Pradesh has had demonstrable success with their **custom hiring centre model** to hasten the pace of farm mechanisation.
 6. **Strengthening extension systems:** Public Private Partnership in KVKs.
4. **Diversification: Promotion of high value crops (HVCs)**
1. **Encourage diversification to HVCs:** Design an incentive mechanism to wean farmers away from cereal crops to HVCs.
 2. **Establish regional production belts:** As in the cluster-based approach, regional production belts for HVCs need to be identified and supported through the Mission on Integrated Development of Horticulture (MIDH).
 3. **Use of hybrid technology in vegetables.**
 4. **Root stocks technology for production of fruits:** Rootstock technology has shown the capacity to double production and be **resilient to climate stress**.
 5. **Smart horticulture:** There have been pockets of success spread throughout the country, using techniques such as **high-density plantation**, protected cultivation and organic production.
 6. **Strengthen market for organic products:** Targeted efforts to create a market for niche products is recommended.

Policy and Governance in agriculture

1. Promote through government policies the emergence of ‘**agripreneurs**’ so that even **small and marginal farmers** can capture a higher share of value addition from ‘farmgate to fork’.
2. **Current situation**
 1. In the **years post-independence**, the policy structure was **focused on increased production and productivity** to ensure food security for India. However, to achieve the target of doubling farmers’ income by 2022-23, we need to shift our **focus from agriculture to**

agri-business.

2. The current government has taken several steps to improve private investment in agriculture. **100 percent foreign direct investment (FDI)** was allowed in 2016-17. Similarly, the **SAMPADA** scheme targets creation of food processing infrastructure. The **budget allocation to the food processing sector was doubled** in the Union Budget 2018-19. Introduction of the **Model APMC act, Model Contract Farming Act**, new guidelines for **agro-forestry** are some other key policy initiatives taken over the past few years.

3. Constraints

1. **Fragmented land holdings.** This makes it difficult for them to access credit or new technology, severely affecting farm productivity.
2. **Low price realisation.** Prices also tend to fall below the minimum support prices in a good production year, leading to agrarian distress.
3. **Non-farm employment.**
4. **Agricultural credit.**
5. **Agricultural trade.** Exporters of agro-commodities are not successful in raising their share in global markets.

4. Way forward

1. **Marketing reforms:** Model APMC provides for progressive agricultural marketing reforms, including the **setting up of markets in the private sector**, allowing **direct sales to exporters/processors and customers**, farmer-consumer markets, **e-trading**, **single point levy of market fee**, and the launch of the **e-NAM**.
2. **Amend Essential Commodities Act:** The Essential Commodities Act, which has **proven a disincentive to large investment in agricultural technology and infrastructure**, should be replaced with a modern statute that balances the interests of farmers and consumers.
3. **Stable export policy.**
4. **Price realisation:** Replacing the minimum support price (MSP) by a **minimum reserve price (MRP)**, which could be the **starting point for auctions at mandis**. Raising MSP or prices can only be a partial solution to the problem of assuring remunerative returns to farmers. A long-term solution lies in the **creation of a**

competitive, stable and unified national market to enable better price discovery, and a long-term trade regime favourable to exports.

5. **Contract farming:** Encourage states to adopt the Model Contract Farming Act, 2018.

6. **Land aggregation**

1. **Encourage states to adopt the Model Agriculture Land Leasing Act, 2016:** The Model Act aims to improve land access to small and marginal farmers through land leasing, whilst also providing for a mechanism for tenants to avail of institutional credit.
2. **Digitise land records:** Complete digitization of land records is a must for effective implementation of land leasing.
3. **Promote farmer producer organizations (FPOs):** There are now 741 FPOs in the country, managed under the aegis of Small Farmers Agribusiness Consortium (SFAC). They have demonstrated that aggregating farmers can help achieve economies of scale.

7. **R&D**

1. Focus on precision agriculture.
2. Create a knowledge hub to disseminate best practices.

8. **Innovation**

1. Several breakthroughs have the clear potential for quickly doubling farmers' income. One is the recorded success of zero budget natural farming by Subhash Palekar. Rapid progress has also been made in organic farming techniques, which have also helped improve incomes of cultivators and dairy farmers.
2. Two, there are patented herbal inputs that improve soil quality and make plants more pest resistant.

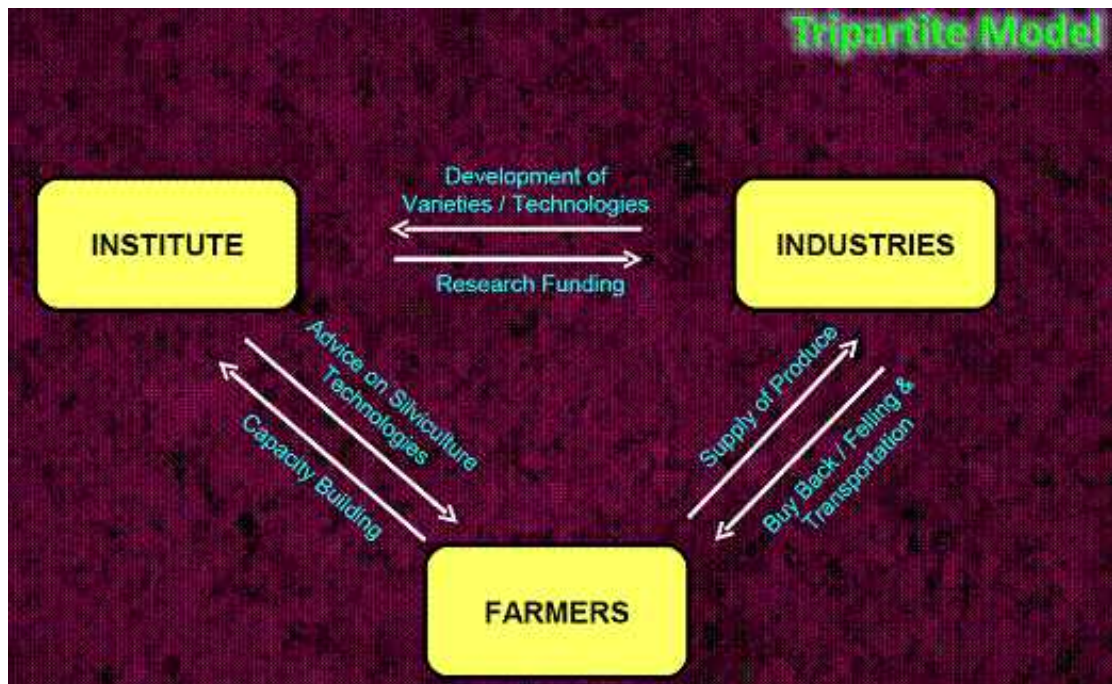
9. **Non-farm income**

1. Create and nurture agripreneurs for achieving greater value addition through agro-processing and propagation of modern extension services.

5. We should transform agriculture from a way of life to an enterprise and agricultural workers as agripreneurs.

Contract farming

1. Contract farming is the **contractual arrangement** between **farmer and the firm** specifying one or more conditions of production and/or marketing of an agricultural product.



2.

3. Advantages

1. **Farmers** have a **guaranteed market** outlet, **reduce their uncertainty regarding prices** and often are supplied with **loans** in kind, through the provision of **farming inputs** such as seeds and fertilizers.
2. **Purchasing firms** benefit from having a **guaranteed supply** of agricultural products that meet their specifications regarding **quality, quantity** and **timing** of delivery.

4. Challenges

1. **Uneven nature of the business relationship** between farmers and their buyers. While contract farming appears to provide financial security to farmers, it can also lead to greater insecurity as **farmers become dependent on these companies for their livelihoods**.
2. On the **supply side**, the most important constraint has been the **scale of farm produce**. 86% land holdings are less than 2 hectares. **Buyers have no incentive** for contract farming with a large number of **small and marginal farmers** due to **high**

transactions (ex. costs related to negotiation) and **marketing costs** (ex. cost of collecting produce).

3. Further the problem is **heterogeneity in quality of produce** with a **large number of small farmers**.
4. Contract farming caters primarily to the production of items which requires **high doses of fertilisers and pesticides**, it is often not ecologically sustainable.
5. Contract farming of export oriented products such as **flowers** means that agricultural **land is diverted away from food grains**.
6. Contract farming makes **indigenous knowledge of agriculture irrelevant**.
7. Another, and more widespread aspect of the globalisation of agriculture is the **entry of multinationals into this sector** as sellers of agricultural inputs such as seeds, pesticides, and fertilisers.
8. On the **demand side**, we **have not allowed the big foreign retail chains** like Amazon, Tesco to invest in India (FDI in food retail was opened in 2016). These retail chains have an efficient supply chain and a successful business model running in other countries.

5. Model Contract farming act, 2018

1. **Contract farming** to remain outside the ambit of APMC act.
2. **No right, title of interest of the land** shall vest in the **sponsor**.
3. **No permanent structure can be developed** on farmers' land/premises.
4. Setting up of a state level agency called "**Contract Farming (Development and Promotion) Authority**" to popularise it among the stakeholders.
5. **Constitution** of a "**Registering and Agreement Recording Committee**" at district/block/taluka level for **registration of contract farming** sponsor and recording of contract, so as to implement effectively contract farming.
6. In addition to contract farming, services **contracts all along the value chain** including pre-production, production and post-production have been included.
7. **Ensuring buying of entire pre-agreed quantity** of one or more of agricultural produce, **livestock** or its product of contract farming producer as per contract.

8. Enables **production support**, including **extension services** to the contracting farmers or group of farmers through supply of quality inputs.
9. Promoting Farmer Producer Organization (**FPOs**) / Farmer Producer Companies (FPCs) to **mobilise small** and **marginal farmers** to benefit from scales of economy in production.
10. **Accessible and simple dispute settlement mechanism** at the lowest level possible provided for quick disposal of disputes.

ZBNF

Answer:- Zero Budget Natural Farming (ZBNF) is a farming practice that believes in natural growth of crops without adding any synthetic fertilizers and pesticides or any other foreign elements. The word 'Zero Budget' refers to the zero-input cost for all crops (inter crops, border crops, multi crops) and can be achieved through locally available inputs like cow dung as fertiliser and cow urine as pesticides or to increase soil fertility.

Features of ZBNF

The four wheels of ZBNF are Bijamitra, Jiwamitra, Mulching, and Waaphasa.

- **Bijamitra** is a natural way of seed treatment, where farm saved seed treated to prevent fungal infection by using local cow urine and cow dung.
- **Jiwamitra** is the solution to increase the growth of microorganisms to make cultivation self-sustainable. It is made using water, cow dung, cow urine, jaggery, Dal flour and soil.
- **Waaphasa /moisture** is that microclimate in the soil, by which the soil organisms and roots can live freely with availability of sufficient air and essential moisture in the soil thereby need of irrigation get reduced.
- **Mulching/Acchadana** to prevent the loss of soil moisture and to decrease soil erosion and can be helpful in adding micro-nutrients. Any of the three types of mulching techniques i.e Soil mulch, Straw mulch, and Live mulch can be used.

Other Components: Intercropping mixed agriculture to decrease the cost of production, storing water in the ponds, practicing composting on the farm itself etc. are important feature of ZBNF.

Insects and pests are managed using Neem leaves name Pulp and green chillies.

Difference between Organic Farming and ZBNF

- Organic farming is not concerned about zero-input cost but the basic premise of the ZBNF is zero-input cost.
- The focus of the organic farming is to make the crop produced free of synthetic elements whereas ZBNF is about the holistic development of the agriculture sector through mixed farming, livestock rearing, aquaculture, intercropping, crop-rotation and so on.
- For the successful implementation of the organic farming, we need to have agriculture extension services e.g. demonstrations of agricultural technologies. Further, it requires

investment, better seeds, efficient backward and forward linkages, branding, large farm size and so on but the ZBNF is possible everywhere.

1. ZBNF has been practiced for over a decade at small scale level across India. But in the recent times, it has been adopted at a much larger scale in South India. Andhra Pradesh government in an effort to make transition to 100% chemical free farming became the first state to adopt ZBNF. However, few steps like scientific validation of ZBNF, scaling up of investment, diverting existing subsidies away from chemical fertilizers and strengthening the existing KVK network can help in widespread adoption of ZBNF.
2. According to UN Environment, ZBNF also creates the social capital necessary for vibrant and inclusive agricultural production, by establishing farmers' federations and SHGs, and placing farmers at the forefront of knowledge creation and dissemination.

Organic farming

1. Organic farming is a form of agriculture that relies on techniques such as crop rotation, green manure and biological pest control. Organic farming aims to keep the soil alive and in good health by use of organic wastes and other biological materials along with beneficial microbes to release nutrients to crops for increased sustainable production in an eco-friendly pollution free environment.
2. **Advantages**
 1. Increased nutrient content in the food.
 2. Free from poisonous content.
 3. Better and organic taste.
 4. Longer storage life.
 5. Reduced costs for farmer.
 6. Less resource utilisation. Ex: reduced water and fertiliser usage.
 7. Minimising environmental degradation.
 8. Reduced soil erosion.
3. **Challenges**
 1. Lower productivity.
 2. There is a serious shortage of good quality organic inputs, which

increases the risk of loss of yield.

3. **Supply chain is underdeveloped** and small and mid-sized farmers located in hilly regions and tribal belts find it extremely difficult to access the market.
 4. **There is a shortage of pack houses and refrigerated vehicles**, which leads to spoilage. Organic products have to be **stored separately** from conventional products to avoid cross-contamination and the existing supply chain does not often provide that facility.
 5. Indian Agricultural Research Institute findings, **33% of organic products sold contained pesticides residues**.
 6. Organic farmers are forced to sell their produces at **premium prices** due to reduced produce. This makes it unaffordable for the common man.
4. **Organic farming brings back human's harmonic way of life with nature.** This is way forward for the world which is riddled with climate change and other ecological problems.

Agricultural export policy, 2018

1. **Policy changes:** Reforms in **APMC Act** and streamlining of mandi fee.
2. **Infrastructure:** Creating **inland transportation** links alongside **dedicated agricultural infrastructure at ports with 24x7 customs clearance** for perishables.
3. **Quality regimen:** A holistic response to **Sanitary and PhytoSanitary (SPS)** and **Technical Barriers to Trade (TBT)** barriers faced by Indian products.
4. **Focus on clusters:** Involvement and engagement of **small and medium farmers** for **entire value chain as group enterprise** within cluster of villages at the block level for select produce.
5. **Creation of Agri-start-up fund:** **Entrepreneurs** are to be supported to start a new venture in Agri products exports.
6. **Promote value added organic exports.** Organic products in North East development of 'AMUL' style cooperatives.
7. Marketing and promotion of **Brand India**.
8. Attract **private investments in export oriented activities** and

infrastructure.

9. **Greater involvement of state governments in agriculture exports.**

Cropping patterns

1. Cropping pattern is a description of the **spatial distribution of different crops**. A change in cropping pattern means a change in the proportion of area under different crops. It has been estimated that **more than 250 double cropping systems** are followed through out the country.
2. **Why India has multiple cropping patterns**
 1. **Rainfed agriculture** still accounts for **65 percent** of cropped area. A large diversity of cropping systems exists under rainfed and dry land areas with an over riding practice of **intercropping**, due to greater **risks involved** in cultivating larger area under a particular crop.
 2. Crop production in India remained to be a **subsistence** rather than commercial activity. Farmers primarily grow to fulfill 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.
 3. Under influence of above factors, **cropping systems remain dynamic** in time and space, making it difficult to precisely determine their spread using conventional methods, over a large territory. However,
 4. 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 along with **MSP regime** has skewed cropping pattern towards cereals, although, a shift is being witnessed towards other commercial crops and horticulture.
3. **Geographical factors**
 1. **Soil: Black soil** in Deccan plateau is good for cotton.
 2. **Climate:** In the **summers** where temperature is high, tropical crops like **Gaur, bajra** while in **winter** temperate crops like mustard, wheat is grown.
 3. **Rainfall:** In the **dry regions** where the rainfall is scanty, more dependence on rainfed crops like coarse cereals. **Water logging areas cultivate rice.**

4. **Topography:** Tea is grown on gentle slopes.

4. Economic factors

1. **Prices also influence cropping patterns.** One is that the variations in the intercrop **price disparities** led to shifts in acreage between the crops. Another is that the maintenance of a **stable level of prices** for a crop provides a better incentive to the producer to increase the output. **Relative profitability** per acre is main consideration which influences the crop pattern.
2. There is a relationship between the **farm size and the cropping pattern**. The **small farmers** are first interested in producing food grain for their requirements. Small holder therefore devotes relatively small acreage to cash crops than large holders.

5. Government policies

1. **MSPs** for some crops like wheat and rice have induced farmers to cultivate them more and subsequent neglect of others.
2. Food crops act, Land use act, **intensive schemes for paddy**, for cotton and oilseeds, subsidies affect the cropping pattern.

6. Technological factors

1. **Irrigation availability** led to cultivation of rice in arid areas of Punjab and Haryana. Lack of irrigation in Bundelkhand region led to cultivation of coarse cereals more.
2. **Improved varieties, mechanisation, plant protection**, access to information, etc., are also factors which influence cropping pattern.

7. Social factors

1. **Food habits** also play a role. East and South India prefers rice as **staple food** while it is wheat in North India.
2. Major reason of tea plantations succeeding in **Darjeeling** and not in Himachal Pradesh was **availability of labour from UP and Bihar** and not in HP.

8. Issues and solutions

1. **Excessive use of water** leading to ground water depletion and **soil erosion**. Water scarcity is already showing its effect in **Punjab, Haryana and Western Uttar Pradesh**.
2. **Because of skewed MSPs**, cropping patterns are highly skewed in the favour of rice and wheat and against pulses. Govt should educate farmers of benefits in **diversifying crops**.

3. **High doses of fertilisers and pesticides** are applied due to bad Urea policy. This has affected productivity and reduced organic matter. Now to **sustain earlier yield levels** farmers need to apply **higher fertiliser** doses. Govt need to move away from current subsidy regime to Nutrient based subsidy incase of urea.
4. **Lack of information about global factors** has resulted in farmers sowing the crop despite their being no demand. **Agriculture extension** services with help of technology can take care of this problem.
5. **Land diversion** of highly productive irrigated land to non-agricultural uses such as industry, housing etc., specially at rural-urban interface needs to be viewed seriously. **Although land acquisition is important**, such productive lands should not be taken away.
6. A critical **lacunae in past agricultural research** approach has been inadequate effort to take into account the experience and knowledge base of the farming community. This **top down** approach of agricultural scientists had given poor results.
7. Indian farmers should also **diversify their cropping pattern** from **cereals to high value** crops. This will increase incomes and reduce **environmental degradation** simultaneously. Because fruits, medicinal herbs, flowers, vegetables, bio-diesel crops like jatropha and jojoba need much less irrigation than rice or sugarcane.
8. **During 1960s** this would have been seen as a **disaster**. But if India imports cereals while exporting high-value commodities, it will be following **successful economies** like Italy, Israel and Chile.

9. Cropping patterns in drought regions

1. **Growing crops like maize, millets, pulses** which can grow in even hostile condition and lesser than average water. Promoting pulse production can serve twin benefits of reduced **food inflation** and **nutrition deficiency**.
2. Promoting **horticulture** and **floriculture** under controlled water and **temperature technology** to ensure assured income for farmers is also a way forward.
3. **Flowers such as Jerbera (bio-fuel crops)** which do not require a lot of water can be grown.
4. We also need to invest in **research** to produce crops which are of

short duration, drought resistant and heat resistant varieties and pre harvest sprouting tolerant grains to offset climate change.

10. **Solutions to water crisis**

1. **Natural and constructed wetlands** also biodegrade or immobilise a range of emerging pollutants.
2. **Watershed management** is another nature-based solution to spur local economic development, job creation, biodiversity protection and climate resilience.
3. **Environmentally friendly agricultural systems** like those which use practices such as conservation tillage, **crop diversification**, **legume intensification** and biological pest control work as well as intensive input systems.
4. **Micro-irrigation** methods like drip, sprinkler, etc can also be promoted to improve water use efficiency.

Farm mechanisation

1. **Rapidly growing demand for food** has brought forward the need of efficient agriculture. Thus, it becomes imperative to focus on **improving intensity of farm mechanisation** in country.
2. **Advantages of farm mechanisation**
 1. It **lowers cost of cultivation**, as it saves human labour and cattle.
 2. **Increase in crop intensity** and **yield** thus ensuring better returns to farmer. Farmers renting equipment have reported **yields rising by around 20%**.
 3. **Reduction of risk of weather** and **non-availability of labour** thus minimising post harvest wastage.
 4. Custom Hiring Centres (CHCs) which **rent out machinery to small farmers**, service centres etc., for **employment of rural youth**.
 5. Improved working conditions and **enhanced safety for farmers**.
 6. **Conversion of uncultivable land** to agricultural land through advanced tilling technologies.
3. **Difficulties in farm mechanisation**
 1. Indian agriculture is highly **diverse in terms of farm size and soil types**. So farms need customised farm machinery and equipment for different regions of the country.

2. Majority of **small cultivators are poor** who are not in a position to purchase the **costly machinery** like tractors, combine harvesters etc., coupled with **poor knowledge** of farmers.
3. Due to **land fragmentation**, the farm size is less. As a result of this, farm machinery generally remains **under-utilised**.
4. **Skewed and seasonal usage** due to crop growth in rainy season. There is **lack of sufficient irrigation to use it round the year**. As still 65% of lands in India are not irrigated.
5. Increased mechanisation **results in surplus draught cattle** and their upkeep is a concern for the farmers.
6. The **lack of repair and replacement facilities** especially in the remote rural areas is another hindrance.

4. Recommendations

1. Formation of **cooperative** for **ownership of farm machinery** at village level. Supporting the finance of second hand tractors for small farmers.
 2. Encourage **land consolidation** and **development of land lease market**.
 3. Need to focus research efforts towards design and development of farm machinery **suitable for different types of soils**, farm sizes and diverse crops.
 4. Focus on **standardisation and quality control** especially for **farm equipment** so as to protect the interest of farmer and increase usage.
 5. Strengthening the agriculture extension services such as **in-field demonstration** by the **experts**.
 6. Develop a legislative and structural framework that encourages custom hiring (renting) services.
5. Though mechanisation has improved the state of agriculture in certain parts of the country, it is still in **nascent stage** and it will remain so unless concrete measures are taken to propel farmers towards adoption of efficient farm mechanisation practices.

Agricultural labour

1. Given the fact that a large part of Indian workers were in the **unorganised sector** with almost no bargaining power, the workers were likely to be

exploited by employers and **paid below subsistence wages** and hence **Minimum wages Act, 1948** was passed.

2. Lacunae in the implementation of act

1. **Informalisation of the tenants** due to unintended consequences of stringent tenancy laws, thus, making the **formal identification of the labourers difficult** to implement the act.
2. **Less focus on increasing awareness** about the act among workers. The workers are compelled to accept lower wages due to factors such as **weak bargaining power, lack of availability of work**, indebtedness etc.
3. **Low penalties for non-compliance** dissuade employer to contravene the provisions of the Act. Also the procedure for imposing the penalty is cumbersome.
4. **Enforcement responsibility vested in the states** and thus, we have vast differences in the minimum wages fixed in **different states** and for different activities and occupations. It makes monitoring and fixing accountability challenging.

3. Following measures

1. **Reforming the tenancy laws** to **prevent informalisation** and ensuring welfare of agricultural workers.
2. **Linking wages with CPI** and updating it every 5 years as provided in the minimum wage act.
3. **Skilling** agricultural labour to increase their **bargaining power** and also open up different avenues of employment to reduce disguised unemployment.
4. **Digital empowerment** of workers to connect them to **labour market** and find decent low skilled works in the nearby areas.
5. **Better compliance** with minimum wage act by **simplification of the act**. Steps should be taken to **reduce multiplicity** of minimum wage rates across centre and states.
6. **Increasing the penalties of non-compliance** and increasing awareness of labour force.
4. The **implementation of the act** in letter as well as spirit only can help India to achieve the ideals enshrined under **article 43** of the **Indian constitution**.

Evergreen revolution

1. Evergreen revolution means the pathway of **increasing production and productivity** in a manner such that **short and long term goals of food production are not mutually antagonistic**. It also implies to produce

more from less land, less pesticide, less water and it must be a sustainable agriculture practice.

2. **Nutritional security**

1. It can address the problems of malnourishment, hidden hunger by increasing the production of milk, pulses, fortified food and other micronutrient rich foods.
2. It also aims for higher productivity and thus increases farmers income who can now invest in health. Thus, leading to better health and educational outcomes.
3. It aims to produce more from less and thus decreases the pressure on water resources leading to better access to water and ecological sustainability.
4. Educational outcomes being a spinoff of evergreen revolution can lead to increase in awareness on sanitation.

Climate change on food security

1. Climate change has added to the enormity of India's food security challenges. At the heart of the **Sustainable Development Goals (SDGs)** are targets to end **hunger**, achieve **food security**, and improve **nutrition**.
2. **Impacts**
 1. **Warming temperatures** will have impact on the **yields** of crops over a range of important food producing areas such as **Australia, North America** and **India**.
 2. At **sea**, warming temperatures will cause changes to the **abundance and range of marine species** used for food, leading to implications for both the billion people who depend on **fish**. Rising sea level will have an impact on **coastal agriculture** thereby affecting food security.
 3. Changing **monsoon patterns** in the country and **unseasonal rains** have an impact on the cropping seasons. In the past two three years we have seen **crops getting destroyed by unseasonal rains**, hailstorms in Maharashtra, Gujarat, Punjab etc. **Escalation of heat waves**.
 4. Climate change increases the **frequency and intensity of some disasters** such as **droughts, floods** and storms. Climate related disasters have the potential to **destroy crops**, critical infrastructure,

and key **community assets**, therefore deteriorating livelihoods and exacerbating poverty.

5. Climate change **could increase the prices** of major crops in some regions. **Nutrition** is likely to be affected by climate change through related impacts on food security, **dietary diversity**, care practices and health.
6. **85% of farmers in India are small and marginal** with less than 2 hectares of land. They are dependent on monsoon.

3. Steps required

1. Indian government should assist farmers by providing **value added weather services** to farmers. An **early warning** system should be put in place to monitor changes in pest and disease outbreaks.
2. Efficient **water use** such as frequent but **shallow irrigation, drip and sprinkler irrigation** for high value crops, irrigation at critical stages.
3. Farmers can adapt to climate changes by shifting to **planting dates, choosing varieties with different growth duration**, or changing **crop rotations**. Developing short duration crop varieties that can mature before the peak heat phase set in.
4. **The NSS 70th round** indicates that a very small segment of agricultural households utilised **crop insurance** due to a **lack of sufficient awareness** and knowledge. Hence there is an urgent need to educate farmers, reorient Krishi Vigyan Kendras and other grass root organisations with specific and more funds.
5. **Preventive measures for drought** that include **on-farm reservoirs** in medium lands, growing of pulses and oilseeds instead of rice in uplands, **mulching** and more application of farmyard manure.
6. We **need to transmit best practices** elsewhere such as growing **Kuttanad rice** in low lying water inundated areas of Kerala to other parts of the country.
7. Improve **non-farm incomes** to the poor farmers by encouraging **animal rearing**, etc.
8. Promotion of **satellite enabled agriculture risk management**, creating micro-level agro-advisories, providing customised real time data and capacity building of stakeholders.

4. Steps taken by the Government

1. **Indirect steps**

1. Pradhan Mantri Krishi Sinchayee Yojana.
2. Pradhan Mantri Fasal Bima Yojana.
3. Soil Health Card.
4. Paramparagat Krishi Vikas Yojana.
5. National Agriculture Market (NAM) and other rural development programmes are positive interventions that can address the vulnerability of farmers and rural households.

2. Direct steps

1. National Innovations on Climate Resilient Agriculture (NICRA).
2. National Mission for Sustainable Agriculture (NMSA).
3. National Adaptation Fund (NAF).
4. State Action Plan on Climate Change (SAPCC).

5. Diversification of agriculture

1. Promotion of cultivation of pulses and coarse cereals under National Food Security Mission (NFSM) and oilseeds under National Mission on Oilseeds and Oil Palm (NMOOP).
2. Crop diversification programme in Green revolution states as a sub-scheme of Rashtriya Krishi Vikas Yojana (RKVY) to divert the area of water guzzling paddy to alternate crops like pulses, oilseeds, maize, cotton and agro forestry system.
3. Technology Mission for the Integrated Development of Horticulture in the North-eastern region. This will ameliorate the regional bias. Initiative for nutritional security through Intensive Millet Promotion (INSIMP), National Horticulture Mission (NHM) and Technology Missions.
4. Promoting water conservation techniques like System of Rice Intensification (SRI), etc.
5. Promoting organic farming through various schemes like Paramparagat Krishi Vikas Yojana (PKVY), Rashtriya Krishi Vikas Yojana (RKVY) etc.
6. Indian Council of Agricultural Research (ICAR) has developed new pulse variety (PUSA Arhar -16) with extra early maturing period.

6. What should small farmers do

1. Farming as per agro-climate zones: Punjab farmers are

practising **water intensive** crops like sugarcane, rice, which is climatically not suitable. Thus, practising farming as per agro-climatic zonation would be sustainable.

2. **Clean energy:** Farmers need water and machines which runs on diesel, and kerosene causing pollution. They should be replaced by clean energy sources, thus **adapting climate smart technologies** and to reduce emissions from agriculture.
3. **Scientific knowledge:** Farming community **need to upgrade their scientific understanding** about **seed inputs**, **fertiliser**, use of **water** and agricultural practises, so that they can mitigate the impact of climate change as well as get adapted to technologies such as biogas and **drought and flood-resistant crop** varieties, shifting to **micro-irrigation**.
4. **Adaptation methods:** **Inter cropping**, multiple cropping and **crop rotation**, **zero tillage**, **rainwater harvesting**, **afforestation**, alternate wetting and drying of paddy, by reducing the frequency of irrigation, methane emissions from flooded rice production can be cut in half.
5. **Collective farming:** Small farmers can adopt the **collective farming** approach and introduce modern technologies to increase the yield.

7. Climate proofing of development

1. Adoption of **policies** that are **sustainable** and help mitigate climate change impact. Ex: Bio-agriculture, **Green Energy**, etc.
2. Build **smart cities** with additional focus on disaster mitigation, better flood management, etc.
3. **Stakeholders** should be involved in **policy making** so as to address their concerns and ensure their involvement in execution.
4. **Encouraging innovation** to develop technology and techniques that may bear impact of climate change. Ex: Disaster resistant seeds.

8. Steps being taken for promotion of allied activities

1. **Integrated Farming system:** Focuses on **horticulture**, **livestock**, and **bee keeping** along with agriculture. This scheme will not only increase farmers' income, it will also mitigate the effect of drought, flood, and other natural disasters.
2. **RKVY-RAFTAAR:** To make farming a remunerative economic

activity through strengthening the farmer's effort, mitigating risk and promoting agribusiness entrepreneurship.

3. **National Agro-Forestry Policy:** It has been prepared for increasing the **income of farmers and for achieving climate support**.
4. **Reconstituted National Bamboo Mission:** Under it Bamboo cultivation is promoted to diversify farmers Income. The **Indian Forest Act, 1927 was amended**, to **remove bamboo from the definition of trees** so as to promote its hassle free production and marketing.
5. **Livestock promotion:** Conserving indigenous breeds under **Rashtriya Gokul Mission**, improving **genetic makeup**, increasing milk production, establishing **Dairy Processing and Infrastructure Development Fund**, generating self-employment opportunities through Dairy Entrepreneurship Development Scheme.
6. **Beekeeping:** Promoted through training large number of farmers/beekeepers, registering bee keepers and honey societies, establishing Integrated Bee Keeping Development Centres (IBDC).

Pulses

1. **Pulses are a major source of protein** in India and also help in soil rejuvenation without consuming much water. There is **mismatch between demand and supply** due to stagnant production of pulses, caused by low yield.

2. Why low production of pulses

1. **Yield of pulses is low** because of **lack of HYV seeds** while rice and wheat have various varieties of seeds.
2. Long duration of crops, **susceptibility to pests and diseases** are some of the reasons why farmers find it difficult to fit pulses in the usual cropping pattern.
3. **Low MSP** offered by Govt for pulses also discourage the farmers from producing pulses. While rice and wheat have **skewed MSP** pricing.
4. Cultivation of pulses has been pushed to more and more **marginal and unirrigated lands** with **low fertility**. Hardly 15 percent of the total pulses acreage is irrigated.
5. **Import and export policies** of pulses are aimed towards taming **domestic prices** to protect consumer interests, exports are restricted while import is

allowed with low duties. It kills motivation among farmers to invest in pulses.

6. **Absence of buffer stock policy** for pulses for a long time is also a factor.

Lack of procurement and storage infrastructure in warehouses and **NAFED** results in sudden decrease of prices right after harvest of pulses.

7. Lack of **information** to farmers on the **beneficial effects of growing pulses** to the soil fertility.

8. Though pulses are priced as high as **Rs.200/kg**, most of the money is earned by the **middlemen** and distributor, not the farmer. Hence, farmers due to **low returns** have little incentive for growing pulses.

3. Steps taken by the Government

1. **Raising the MSP for pulses** to help push up their output.

2. The previous Government has come up with a program called **Pulses Villages** under **Rashtriya Krishi Vikas Yojana (RKVY)**. Some **5000 odd villages are adopted** and intensive cultivation of pulses was practised.

3. **Inclusion of cluster demonstrations** in rice fallows for **pulses cultivation** under **BGREI** (Bringing Green Revolution in Eastern India) scheme in order to increase production of pulses in Eastern India.

4. Initiating programs such as **accelerated pulse production program** under National Food Security Mission (**NFSM**).

5. **Seed hubs** are being created through **ICAR**, State Agriculture Universities (SAUs) and **KVKs** for ensuring the availability of new kinds of seeds.

6. **ICAR developed Pusa arhar-16** variety with early maturing feature.

7. **Dal diplomacy** is under way to scale up the approximately **5 million tonnes of pulses** India procures from 46 countries. Recent signing of pact with Mozambique to double pulses imports from it.

8. **Restrict exports** of these commodities and open up imports at zero duty. **Suspend forward and futures trading** of pulses.

9. Invoke the **Essential Commodities Act (ECA)** to impose **stocking limits**, forcing private trade to liquidate stocks immediately.

4. Other remedies

1. Encourage **states** to **delist pulses from their APMCs**.

2. **Abolish stock limits under the ECA**. It will encourage and incentivise the farmers to store not sell off immediately. It will help in **building the buffer stock** and most importantly the benefits of this buffer stock will go to farmers not to the hoarders.

3. Need to employ advances of **biotechnology** to create seeds that are **drought tolerant**, input responsive and pest and **disease resistant** to increase the **yields** and output of pulses. Distribution of good quality seeds for free.

4. Devise a **crop neutral support policy** for farmers. This should incentivise farmers to shift from the current major crops to pulses. It will also help alleviate the supply glut faced by rice, wheat and sugarcane.
5. Create a **new institution** as a Public Private Partnership (PPP) to compete with and complement existing institutions to **procure, stock and dispose** pulses.
6. There is also a need for an **import duty** of about **10 percent** on pulses to make sure that the landed costs of imported pulses are not below MSPs. Lay down a framework for **allowing exports of pulses** after a particular threshold of domestic production is met. This **would incentivise more farmers** to cultivate pulses due to higher international prices. R&D should be promoted to provide for HYV pulses.
7. **A robust commodity exchange** should facilitate price discovery and spot prices should be reflective of future volatilities. **With regulations through the SEBI**, the exchange can act as a messenger of short to medium run future prices.
8. The government should promote **awareness through farming cooperatives** and KVKs among farmers regarding the advantages of growing pulses such as increasing fertility.
5. Farmers need to be assured of **remunerative prices** and **financial assistance** to buy new seeds, fertilisers, plant protection chemicals etc. Pulses are necessary for **nutritional security** of the nation as pulses consumption is necessary for reducing **maternal and infant mortality**.

Coarse cereals

1. Coarse grains refer to cereal grains **other than wheat and rice** or those used for **animal feed or brewing**. They constitute Jowar, Bajra, Maize, Ragi etc.
2. **Importance of coarse grains**
 1. They are **rich source of nutrients** and thus would help fight **hidden hunger**. Ex: Bajra is high in iron content, Ragi in Calcium etc. **Being inexpensive**, they can provide an accessible source of essential nutrients to poor..
 2. They can be used as nutrient **rich fodder**, thereby holds the potential to boost **livestock productivity**.
 3. They can be used as raw material in food processing industries. Such products can be sold in **international market** as well adding

to our forex reserve.

4. Coarse cereals can be grown in **harsh climate**, thereby can bear the ill-effects of climate change being witnessed by Indian agriculture.
5. **Their cultivation is less input intensive**. Thus would help reduce the burden on fertile soil and underground water.
6. They provide **additional income to marginal farmers** and acts as insurance in case of crop failures.

3. Coarse grains can be integrated in our cropping pattern

1. **Multi-cropping** and **Inter-cropping** practises. Cereal grains can be **grown along with input intensive crops** like rice and wheat. This would help maintain **soil fertility** and can provide assured income to farmers in case their main crop fails.
 2. Incentives like **MSP** (Minimum Support Prices) which is **currently restricted to non-coarse cereals** can be extended to coarse cereals.
 3. **Increasing share of these crops** in **National Food Security Mission (NFSM)** and in Mid-day meal scheme.
 4. **Removing supply chain inefficiency** and **marketing bottlenecks** for coarse grains and creating **robust procurement** mechanism for coarse cereals.
 5. Initial support to farmers for cultivating coarse grains in forms of **subsidy**.
 6. Research and development is required to develop **HYV seeds** for coarse grains. The **extension services** through **KVKs** must be provided to farmers.
 7. Creating market for the coarse grains by change in **consumer choice**, new food habits through **advertisements**, awareness campaigns, social media etc. Education and awareness among people about the benefits of nutri-cereals.
 8. **Promoting food processing industries** that use coarse grains as input.
 9. **International cooperation** like in pulses to promote their cultivation abroad and import it to India to meet demand if need be.
4. The initiatives must be implemented effectively keeping in mind the importance of coarse grains in not only ensuring **nutritional security** but also **promoting balanced regional growth** and safeguarding farmers'

interest.

Horticulture

1. **Horticulture production**, including fruits and vegetables, in **2016-17** **outstripped food grain** output for the fifth year in a row. Horticulture now accounts for more than **one-third** of the agriculture sector's GDP.
2. **Potential of Horticulture sector**
 1. Many horticulture crops are **short duration** crops, and **grown in small plots** of land, hence **small and marginal farmers** now prefer to grow them.
 2. It is **highly productive**. Horticultural harvest of 295 million tonnes has been gathered from **just one-fifth of the area** under food grain is a significant aspect.
 3. **Horticulture is highly labour intensive** and availability of cheap labour and **less capital input requirements** are suitable for poor farmers. Even it is less susceptible to bad monsoon.
 4. These crops ensure a **quicker cash** flow, unlike say, pulses, which may take more than six months from sowing to marketing.
 5. Horticulture has expanded in the areas which had been **slow to adopt green revolution technologies**.
 6. **Better incomes, urbanisation**, changing consumption and lifestyle patterns have driven demand of fruits, vegetables, mushrooms, **medicinal plants** and flowers which is addressed by small farms near cities.
3. **Challenges in realisation of full potential**
 1. **Lack of market support** and paucity of post-harvest produce management chain from farm to fork. **Distress sales** and mass destruction due to improper post-harvest handling like **cold storage** and want of processing facilities, lack of refrigerated vehicles to transport.
 2. The **lack of availability of quality planting material**, specially processable and exportable varieties, has been another area of concern.
 3. The **wastage** for horticulture crops is between 5 to 15 percent due to **high perishability** in the case of fruits and vegetables.

4. **Lack of reasonable returns** for produce though consumer prices remain high due to multiplicity of **intermediaries** in horticultural marketing.
5. **Lack of institutional finance**. Lack of private investment due to problem of no **land leasing** and lack of contract farming, cooperative farming. **Absence of micro-irrigation infrastructure**, research in horticulture crops for higher shelf life.
6. **Poor enactment of APMC Acts in states**, open-ended MSP regime encouraging farmers to grow food grains even though the climate may favour horticulture.

4. **Govt initiatives**

1. Centrally Sponsored **Mission for Integrated Development of Horticulture** (MIDH) to **reduce wastage**. Under MIDH, **financial assistance** is provided for setting up and **modernisation** of **nurseries**, **tissue culture** labs, seed and planting material production, seed processing infrastructure and import of planting materials.
2. **Merchandise Exports from India (MEIS)** under Foreign FTP 2015-20, incentivises exports of farm products including **fruits/vegetables**.
3. **APMCs have been reformed in many states** in line with model APMC Act to exclude horticulture crops from it.
4. **Extending GI tags to various horticulture crops** especially from the North-East region.
5. **Model Land leasing bill** prepared by Niti Ayoog to streamline land leasing and increase **private investments in land**.
6. The small and marginal farmers have been mobilised to form **Farmer Producer Organisation (FPO)**.

5. **Way forward**

1. **Vegetable and fruit producers cooperatives**, formed on the lines of the milk cooperatives, can be incentivised to bridge the gap between producers and consumers.
2. **Post-harvest processing** and value-addition, which is rather low at present, needs to be stepped up substantially.
3. Also needed is an extensive network of **refrigerated warehouses** to store horticultural products and minimise wastage.

4. The government needs to put in place a stable **policy regime**, particularly with respect to the domestic and external trade of vegetables and fruits.
5. Government has envisioned to **double farm income by 2022** to bring economic prosperity as agriculture sector employs half of the population in country. To realise it, the horticulture sector holds **significant importance**.

Farmer Producer Organisation (FPO)

1. Union Budget 2019-20 provided for formation of 10,000 new FPOs to ensure economies of scale for farmers over the next 5 years.

Farmer Producer Organisation (FPO) is an entity formed by primary producers, viz. farmers, milk producers, fishermen, weavers, rural artisans, craftsmen. An FPO can be a Producer Company, a Cooperative Society or any other legal form which provides for sharing of profits/benefits among the members.

Major Functions

- To establish a collection centre to aggregate various lots of farmers, FPOs act as a custodian and facilitators for the member farmers produce
- Farmers remain the owners of their produce, price risk & return
- FPOs should aggregate similar quality of produce to make one lot, Separate lots should be made for different qualities
- Basic cleaning should be done by farmers for better price realization , Farmers to deliver produce at FPO's collection centre.
- FPOs to organize transport from collection centre to nearest e- NAM mandi & sensitize farmers to bring bigger lot sizes for ease of operations

Challenges faced by FPOs

- The shares of FPOs are not traded on the stock markets to forestall any risk of hostile takeover by way of equity acquisition.
- Difficulties in securing institutional finance, inability to operate in the regular agricultural markets and the lack of legal recognition under the contract farming regulations.
- The banks are usually wary of granting loans to the FPOs as they do not have assets of their own to serve as collaterals.
- Consequently, the FPOs have to rely on loans from non-banking financial companies or micro-finance companies to raise working capital at very high interest rates.

- Many other kinds of concessions, tax exemptions, subsidies and benefits provided to cooperatives, startups or other grassroots farm bodies have not been extended to the FPOs.
- They also usually face resistance in operating at the regulated mandis because of the resistance offered by the licensed traders and their cartels who wield significant hold over these markets.

Remedial Measures

- Providing FPOs easy access, affordability with respect to institutional finance.
- Benefits enjoyed by cooperatives needs to be extended to FPOs gradually.
- FPOs to be brought under the scope of interest subvention scheme.

Farmer suicide

1. **More than 3 lakh farmer suicides** occurred in the past decade. These can be linked to the **agrarian distress** caused by structural changes in agriculture and changes in economic and agricultural policies.

2. Causes

1. **Landholdings:** **Nearly 85% of farmers are small and marginal farmers** with land holdings less than **1-2 Ha**. Small holdings are not agriculturally **productive** and do not provide a good hedge against crop failure.

2. **Indebtedness:** As per NSSO report, **over 52%** of all farm households in the country are indebted. **Heavy dependence on high cost inputs** further increases farmer distress.

3. **Liberalisation:** **LPG policies** that have exposed Indian agriculture to the forces of globalization. Small farmers find it difficult to **compete** with their technology savvy global counterparts.

4. **Climate change:** It is resulting in greater **rainfall variation** and **drought floods** has increased **farmer's vulnerability**. It may lead a farmer to default on his crop loans.

5. **Crop choices:** Lack of **diversification** of crops, lack of **mixed farming**, changing cropping patterns especially due to the **shift to cash crops** which are highly **water intensive** and **rain dependent**.

6. **State:** The **withdrawal of the state** from agricultural extension activities has been replaced by multinational seed and fertiliser companies. Delay in claim settlement of **agricultural insurance** in case of crop failure due to **red tapism**, delay in crop damage assessment, disputes over land rights and lack of proper land records with state etc.

3. Long term Government efforts

1. **Diversification:** Promoting **farm diversification** by way of National **livestock mission**, Horticulture missions, support for **fishing** etc.

2. **Soil productivity:** Advice to farmers on productivity of Soil. **Soil health**

card scheme, Kissan Call centres, neem coated urea etc.

3. **Irrigation:** Expansion through canals, micro irrigation, use of Pusa hydrogel that increases water absorption capacity of soil etc. PMKVY separating feeder and agri lines etc.

4. **Cropping pattern:** Drought free varieties, less water intensive crops will improve productivity in long run. To improve agricultural resilience against the vagaries of monsoon, there is a need for changing the cropping patterns according to the agro-climatic zones and sustainable agriculture. Ex: Pulses in water deficient areas.

5. **Institutional credit:** Interest subvention scheme, greater credit to farmers through promotion of micro credit agencies and SHGs. Radhakrishnan report on agricultural debt has emphasized the need for state governments to maintain a flexible approach, adjusted to ground conditions in each state.

6. **Insurance:** To protect the farmers from any post-harvest financial losses, there should be a greater coverage of the insurance, etc.

7. **NAM:** To maximise farmer's profit, agricultural marketing and real-time price discovery is needed. This can be done by implementing e-NAM.

8. **Agricultural skills:** Skill India mission should be used for extension to impart agricultural skills. Local participation of progressive farmers, SHGs and Primary Agricultural Cooperative societies (PACS) should be leveraged to help transfer technology through one-to-one exchange of information.

4. Doubling farmer's income by 2022

1. **Increasing incomes by increasing productivity:** Biotechnology is set to play critical role in crop and livestock production. Bridging yield gaps among the States.

2. **Water and agro-input policies:** Rationalising fertiliser subsidy through NPK pricing, integrated water use policy, geographically suited farm mechanisation in India.

3. **Integrated farming system:** Animal husbandry promotion through Pashudhan Sanjivani, Animal Health Card, creation of e-Pashudhan Haat.

4. **Better market price realisation:** Revision of the APMC Act, launch of e-NAM and reducing post-harvest losses.

5. **Policy measures:** Structural reforms in agriculture pertaining to land leasing, nationwide crops competitiveness study, ICT based agricultural extension and integrating all central and state subsidies.

ICT in the aid of farmers

1. 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.

2. Benefits of e-governance to farmers

1. IT supports new methods for **precision agriculture** like computerised farm machinery that **applies fertilisers** and pesticides. Farm animals are fed and monitored by electronic sensors and identification systems.
2. **Information dissemination** throughout crop cycle through technologies like **GIS**, **mobile phones** regarding **weather** conditions, **input requirements** like soil health, fertilizers etc. Example: DD kisan. **e-choupal empowers** the farmers with timely and relevant information regarding **crop prices**, etc., enabling them to get better returns for their produce. **Village Knowledge centres (VKCs)** also help in this direction.
3. IT promotes **agriculture marketing** by integrating national markets through **e-NAM** programme.
4. **PMKSY** aims to assess the damage to crops for **insurance** purposes through satellite and **Drone imagery**. This will improve accuracy and compensation.
5. ICT will help in **land records digitisation and modernisation** which is a great step in removing the malpractices and creating assurance of rightful ownership.
6. Direct connect through the **e-commerce** has facilitated large number of agro-based **small enterprises** in rural areas. **Women's livelihood** is being facilitated amongst the weavers community in the north eastern states by marketing their product through the internet medium.
7. **Kisan credit card use ICT** to provide affordable credit for farmers in India. The Kisan Credit Card allows farmers to have **cash credit** facilities without going through time consuming bank credit screening processes repeatedly.
8. **Private sector can also be involved** now to provide IT solutions and software. This area seems to be most promising as many facilities can be used like audio video conferencing, **fast access to information** etc. This will also provide employment opportunities to youth.

3. Govt initiatives

1. **Financial assistance:** The **Pradhan Mantri Jan dhan Yojana**, along with **DBT scheme** is further planning to extend it to almost all areas.
2. **Land records digitisation:** Some **projects like e-bhoomi by Karnataka Govt** showed how this can help in resolving **land disputes** and other issues faced by farmers.
3. **e-Mandi:** has been launched to make **procurement** of agricultural products

smoother and provide competitive remuneration, especially for small and marginal farmers.

4. **Advisory role:** Use of **Kisan call centres**, **IT kiosk** and **agricultural clinics** to provide information on farm inputs, market prices and consultation.

However, such facilities are available at very few places due to **literacy and language barriers** and even internet connectivity.

5. **Weather information:** Sending mobile **SMS to give weather information** on pilot basis has helped farmers in sowing and protecting crops. Government has recently developed a new app called **NOWCAST** to give weather related information to farmer on timely basis.

6. **mKrish:** It is developed by **TCS** provides on **phone suggestions** for which **crops best for which soil**, seasonal info, **diseases** spreading for crops, best time for harvest. It helped farmer to be get good information with **scientific reasoning** behind them.

7. **Soil health card scheme:** It helps us in **measuring the soil quality** and digitising such record and helping farmer know about **right mix of fertilisers** and nutrient required. Once a farmer gets his soil health card attached with mobile number, he regularly gets update customised for his farmland.

8. **MMP:** Apart from it Government through **NeGP** plans to initiate many mission mode projects, the **National optical fibre network** is also in process. The objective is to avail multiple benefits to farmers and rural community.

9. **Digital literacy:** However the major issue still remains to be **digital literacy, language barriers, farmers lack of comfort and trust** on this alien medium, mode of service availability. All these issues need a resolution, else it is only the large and medium farmers who will avail the benefits, leaving the poor, marginal ones left out.

4. Krishi Vigyan Kendra

1. Krishi Vigyan Kendras (KVKs) are the **frontline agricultural extension center** funded by the Indian Council of Agricultural Research (ICAR). The KVKs focus on **training and education of farmers, rural youth**, on **field demonstration** of new and improved farming techniques etc.

2. It was felt that the Indian farmers do not have knowledge about **scientific farming** methods, the soil crop linkages, **fertiliser requirements** etc. Hence, KVKs were set up to ensure a last mile linkage, which would **provide farmers with information** and training about scientific farming, **mitigation measures** in case of adverse climatic events, **consultancy services** regarding the type of crops to be sown, the type and amount of fertiliser to be used etc.

5. Limitations of KVKs

1. KVKs have different organisational structures. While some come directly under ICAR, others are monitored by State agricultural universities or even Civil Society Organisations. This has led to problems of monitoring and coordination.
2. While the KVKs have had some impact by providing training and some advisory services, their mandate is very large which they have not been able to fulfill due to lack of budgetary support.
3. One KVK has been established in every district in the country. However, a district could be very large. Hence, one KVK has not been enough to cover the entire district. Thus, the impact on KVKs has been only in the immediate surrounding areas.
4. The KVKs do not have integration with the weather monitoring and forecasting services. This impacts their ability to advise farmers about the mitigating steps in case of adverse climate.
5. While KVKs have had some impact, there is potential to do a lot more. The government must look at reviewing the locations of KVKs, meet the manpower requirements and also consider setting up more than one KVK in a district. KVKs are essential in order to reach the goal of at least 4% growth in agriculture. They must be empowered to help proactively in achieving that target.

Economics of animal rearing

1. 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.
2. **Importance**
 1. Livestock contributes 25.6 percent of gross value added in the agriculture sector. It provides self employment to about 21 million people.
 2. Animal husbandry is an integral component of Indian agriculture. Livestock provides 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.
 3. Livestock wealth is much more equitably distributed than wealth associated with land. Majority of livestock market in India is

owned by 67 percent of the small and marginal farmers and by the landless. Thus, growth in this is more inclusive.

4. The small ruminants and poultry livestock provide livelihood support to the poor underprivileged landless, and marginal farm households as their upkeep cost is low and are source of milk, eggs and meat. 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.
5. Livestock rearing at the household level is largely a women led activity, and therefore income from livestock rearing and decisions related to its management are taken within the household are primarily taken by women. This increases role of women in decision making.
6. Livestock rearing, particularly in the rainfed regions of the country, is also emerging as a key risk mitigation strategy for the poorest. They face uncertain and erratic weather conditions which negatively impact crop productivity and wage labour in the agriculture sector.

3. Problems

1. **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.
2. **Diseases:** Frequent outbreak of diseases and poor productivity should be tackled with improved focus on animal health and outreach of veterinary services.
3. **Resource degradation:** Livestock producers are both victims of resource degradation and contributors to it. Corrective action related to environment protection, ecosystem services, community led interventions should be taken.
4. **Markets:** Development of a better paying markets for livestock and commercialisation of livestock.
5. **Human Resource:** Lack of human resource development results in less than optimal output.
6. **Low productivity:** Dead weight of carcass is low, indicating low biomass. For bovine and cattle, milk production is also lesser than international varieties.

7. **Poor hygiene:** Poultry unfit to meet industry and **export norms**.
 8. **Poor finances:** Livestock sector did not receive the **financial attention** commensurate to its contribution. Systematic implementation of loans and insurance schemes particularly in remote areas is needed.
4. **Schemes launched**
1. **Rashtriya Gokul Mission (RGM)**.
 2. **National Programme for Bovine Breeding and Dairy Development (NPBBD)**.
 3. **National Livestock Mission:** Which has 4 sub-missions in it, **Sub-Mission on Fodder and Feed Development**. Sub-Mission on **Livestock Development**. Sub-Mission on **Pig Development** in North-Eastern Region. Sub-Mission on **Skill Development, Technology Transfer and Extension**.
5. **Solutions**
1. **Long term sustainable production** measures should be looked into increase the production and quality of **maize**.
 2. **e-pashuhaat** portal has been developed for **connecting breeders and farmers** regarding availability of bovine germplasm. Through the portal breeders/farmers can sell and purchase breeding stock. Network for a realistic national and global **poultry database and marketing intelligence** may also be developed.
 3. **Active monitoring** and control in case of any **disease outbreaks** in rapid manner.
 4. Implementation of **livestock insurance** schemes is also important. Sufficient **trained manpower** should be developed in the existing institutions.
 5. The **genetic resource** of Indian livestock should be conserved through programmes like **Rashtriya Gokul Mission (RGM)**.
 6. **Proper utilisation of by-products** of **livestock slaughter** for higher income of livestock owners.
6. **Livestock promotion**
1. **Recycling and utilizing agricultural waste** would give a further filip to farmers' income.
 2. **Village level procurement systems:** Installing of bulk milk chillers and facilities for **high value conversion of milk** are needed to

promote dairy in states. The **private sector should be incentivized** to create a value chain for HVCs and dairy products at the village level.

3. **Breed indigenous cattle with exotic breeds**: Breeding of indigenous cattle with exotic breeds needs to be encouraged to arrest the issue of inbreeding.
4. Convergence of schemes in fisheries sector: **Integrate the Blue Revolution scheme with MGNREGA**. Ponds created through MGNREGA should be used to promote aquaculture and can be used to create potential clusters as well.
5. **Capacity building for fish breeders and farmers**: Establish fish co-operative organisations and run village level schemes in coordination with panchayats to disseminate best practices and research.

7. Challenges facing the dairy sector

1. Majority of **grazing lands are degraded** or encroached. Diversion of feed and fodder ingredients for industrial use.
2. **Disease outbreaks** leading to mortality and morbidity. Deficiency of vaccines and **vaccination** setup.
3. **Poor access to organised markets** deprive farmers of proper milk price.
4. Small herd size and **poor productivity**. Inadequate **budgetary allocation** over the years for Animal husbandry, dairying and fisheries.
5. **Poor artificial insemination service network**. This leads to low milk productivity. Limited availability of quality breeding bulls.

8. Challenges facing meat and poultry

1. **Maize** is the single most important ingredient of poultry feed, its availability at a reasonable cost is the major problem of poultry sector.
2. **Pathogenic and emerging diseases** often cause heavy losses both in domestic market and international trade.
3. There is a dire need for **realistic national marketing intelligence** to bridge the gap between supply and demand of poultry and poultry products.
4. To meet the growing demand of sustainable and safe production there is a huge demand for trained and **skilled manpower**.

5. **Large size of target population** to be improved in terms of productivity with application of science and technology pose a formidable challenge.
 6. **Low level of processing** and value addition in animal products.
- 9. Challenges facing the fisheries sector**
1. Shortage of **quality and healthy fish** seeds and other critical inputs.
 2. Lack of resource specific **fishing vessels** and reliable resource and updated data.
 3. **Inadequate awareness** about **nutritional** and economic benefits of fish.
 4. **Inadequate extension staff for fisheries** and training for fishers and fisheries personnel.
 5. **Absence of standardisation procedures** and branding of fish products.
10. The growth in the livestock sector is **demand-driven, inclusive and pro-poor**. The extent to which the potential of livestock can be harnessed would depend on how technology, institutions, policies and financial support address the constraints of the sector.

Irrigation systems in India

1. Flow irrigation

1. The water of a **reservoir or tank usually remains at a higher level**, and when a channel is connected to it, **water automatically flows down** the channel which serves the purpose of a canal for irrigating the land.
2. In this case the **water level remains higher than the fields**.

2. Lift irrigation

1. **Water is lifted from wells and tanks** by a crude country method and from tube-wells by pumps for irrigation.
2. Nowadays the **ground water is used for irrigation by lifting** it by means of electric or diesel pump sets.

3. Irrigation by canals

1. This is the most convenient method of irrigation. About half of the total area under irrigation by canals is situated in **Punjab, Haryana, Uttar Pradesh**, etc. It is **easy to dig canals** in these areas since the land is level and soil is soft.
2. **Artificial reservoirs are created** by constructing dams across rivers for

perennial canals. The **Rajasthan canal** of Rajasthan is the longest canal of Asia. The north western part of Rajasthan is being irrigated by it. **Many canals have been dug out** of the rivers Krishna, Godavari und Tungabhadra of Andhra Pradesh.

4. Irrigation by wells

1. The **rain water sinks down easily** in the areas where the **soil is soft and porous**. So water is available at a **lower depth** when wells are dug and it helps irrigation. Primarily irrigation is carried on by wells in the **western part of Uttar Pradesh**, some parts of Bihar and in the blank cotton soil area of the Deccan. In addition to it, in the **coastal strip of Tamilnadu** and Andhra Pradesh, some parts of Rajasthan, Haryana and Gujarat irrigation is also carried on by wells.

2. The **power driven pumps can lift water** from a much greater depth from tube wells. Now a days **wind mills also lift water** from the wells for irrigation purpose. Irrigation by wells is more **expensive**, so more profitable farming of vegetables is carried on in those areas.

5. Irrigation by tanks

1. **Tank irrigation** is the most feasible and **widely practiced** method of irrigation all over the **Peninsula**, where most of the **tanks are small in size** and built by individuals or groups of farmers by raising bunds across seasonal streams.

2. The soil of this plateau is **hard** and stony and its land is **undulated** and so, it is not easy to dig canals or wells in those areas.

3. **Small channels are dug out of both the sides** of the tanks to irrigate lands. There are big reservoirs like Nizam Sagar, Usman Sagar, Hossain Sagar, Krishna raj Sagar etc. in the peninsular India.

4. Besides, in rural areas of the Peninsula there are large numbers of small tanks for irrigation, but such **tanks dry up during acute drought** period and don't help in irrigation.

6. Terraced irrigation

1. This is a **very labour intensive method of irrigation** where the land is cut into steps and supported by retaining walls.

2. The **flat areas are used for planting** and the idea is that the water flows down each step, while watering each plot. This allows steep land to be used for planting crops.

7. Surface irrigation

1. In surface irrigation systems, **water moves over and across** the land by simple gravity flow in order to wet it and to **infiltrate into the soil**. The main

advantage of this method is that it has **low cost**, **low maintenance** and does not require levelling of land.

2. But the system has **low water use efficiency** due to wastage in seepages and evaporation, soil erosion and runoffs increase.

8. Drip irrigation

1. This is known as the **most water efficient method** of irrigation. Water drops right near the root zone of a plant in a dripping motion. If the system is installed properly you can steadily **reduce the loss of water** through evaporation and runoff.

2. But **high installation cost is involved** and not much awareness among farmers.

9. Sprinkler irrigation

1. This is an **irrigation system based on overhead sprinklers**. You can also have the system buried underground and the sprinklers rise up when water pressure rises, which is a popular irrigation system for use on golf courses and **parks**.

2. Suitable to all types of **soil except heavy clay**. Suitable for irrigating crops where the plant population per unit area is very high. It is **most suitable for oil seeds** and other cereal and vegetable crops.

3. Closer control of water application **convenient for giving light and frequent irrigation** and higher water application efficiency. **There is also less problem of clogging** of sprinkler nozzles due to sediment laden water. It may also be used for undulating area and areas **located at a higher elevation** than the source can be irrigated.

4. But **installation cost is high**, require electricity for running sprinklers.

10. Factors affecting irrigation types

1. **Soil type:** **Sandy soils** have a low water storage capacity and a **high infiltration** rate. They therefore **need frequent** but small irrigation applications. So, **sprinkler or drip irrigation** are more suitable than surface irrigation. Clay soils with low infiltration rates are ideally suited to surface irrigation.

2. **Slope:** **Sprinkler or drip irrigation** are preferred on **steeper** or unevenly sloping lands as they require little or no land levelling. An **exception is rice grown on terraces** on sloping lands.

3. **Climate:** **Strong wind can disturb** the spraying of water from **sprinklers**. Under very windy conditions, **drip or surface irrigation** is preferred.

4. **Water availability:** Water **application efficiency** is generally higher with **sprinkler and drip irrigation** than surface irrigation and so these methods are

preferred when water is in **short supply**.

5. **Water quality:** **Surface irrigation** is preferred if the irrigation water contains **sediments**. The sediments **may clog the drip** or sprinkler irrigation systems. Sprinkler systems are more efficient than surface irrigation methods in leaching out salts.

6. **Type of crop:** Surface irrigation can be used for all types of crops. Sprinkler and **drip irrigation**, because of their **high capital investment per hectare**, are mostly used for high value cash crops, such as vegetables and fruit trees.

11. Why tank irrigation is famous in South India

1. It is **difficult to dig canals** and wells due to **undulating relief and hard rock** structure in south India.

2. **Low percolation** of rain water due to **hard rock** structure. So, not suitable for well irrigation.

3. Also, **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.

4. Most of the tanks are natural and **do not involve heavy cost** for their construction. Even an individual farmer can have his **own tank**.

5. Tanks are generally constructed on rocky bed and **have longer life span**. In many tanks, **fishing is also carried on**. This supplements both the food resources and income of the farmer.

6. **Population and agricultural fields are scattered** which makes canal irrigation economically unviable.

12. Disadvantages of irrigation

1. **Competition for surface water rights**. Depletion of underground aquifers due to excessive water usage.

2. Irrigation with saline or high sodium water **may damage soil structure** owing to the formation of alkaline soil.

3. **Over irrigation** because of poor distribution uniformity or management wastes water, chemicals, and may lead to water pollution.

4. Under irrigation gives poor **soil salinity** control which leads to increased soil salinity with consequent build up of toxic salts on soil surface in areas with high evaporation. This requires either leaching to remove these salts.

5. **Deep drainage may result in rising water tables** which in some instances will lead to problems of irrigation salinity requiring water table control by

some form of subsurface land drainage.

13. Potential of solar based irrigation

1. Solar pumps will reduce **fiscal burden on Government** arising from huge **power subsidies**. The agriculture power subsidy burden was close to Rs. 67,000 crore in 2013-14.
2. Unreliable **power quality** due to shortage of power has hampered irrigation potential.
3. Coal based power also poses **environmental challenges**.
4. Solar pumps could help fill irrigation gaps, **mitigate greenhouse gas emissions** and help farmers adapt to climate change impacts.

14. Issues in solar based irrigation

1. **High investment** cost acts as a barrier for farmers. They are 10 times more costly than diesel pumps.
2. Central and state subsidies as high as **90 percent of the capital cost** are offered. Such a high subsidy rate would be **fiscally unsustainable** if solar pumps had to be deployed at scale.
3. There are concerns around **over exploitation of groundwater**, if pumps have zero or low operational costs.
4. With limited market penetration currently, **spurious and poor quality products**.

15. The steps needed for faster deployment

1. **Quality controls** and performance benchmark are urgently needed, allowing competent manufacturers and **service providers** to compete.
2. **Faster penetration of drip irrigation** technology to ensure that load on solar pumps is reduced and concerns relating to **overuse of groundwater mitigated**.
3. **Instead of subsidising electric pumps**, state governments could divert the same resources as **upfront solar pump subsidies**. They could provide capital subsidies or interest rate subsidies or both to encourage the uptake of solar pumps on a large scale.
4. **Partnership with private players** who are working to make **solar pumps** accessible to small and marginal farmers such as **ClaroEnergy** which rents out mobile solar pumps is required.
5. **Tying the subsidies for solar pumps** to micro irrigation and water harvesting or even integrating with the grid is **another solution**. Such measures could reduce water consumption or give farmers an alternative source of income.

16. PMKSY

1. It provides a sound framework for the expansion as well as effective use of

water in irrigation. It focuses on four broad areas — Accelerated Irrigation Benefits Programme (AIBP), Har Khet Ko Pani, Per Drop More Crop and Watershed Development.

2. Though we have announced ambitious PMKSY goals, progress on the ground needs improvement. At the current pace, it will take decades to reach the goal of Har Khet Ko Pani. Acceleration of pace requires many steps.
3. We need manifold increase in the allocation of funds for PMKSY. We need quick clearance for interlinking of river project. We must include shallow tube wells in Assam and other water rich states in east India in PMKSY.
4. Finally, we need a dedicated agency at national level to push the scheme.

17. Other efforts by Govt to improve irrigation

1. A dedicated irrigation fund has been created under NABARD, which has been asked to issue tax-free bonds to borrow money.
2. The government has now asked the Central Water Commission (CWC) and other agencies to take up completed projects and work towards increasing their efficiencies.
3. Each of these projects would now also have water user associations (WUA) that will decide on how the water is distributed to every claimant in the irrigated area.
4. Solar irrigation.

Buffer stocking

1. FCI's main aim is to provide price support for farmers by procuring at pre-decided prices, storage or buffer stocks and distribution of food grains at subsidised prices to poor people. The ultimate goal of the goal of FCI is to ensure food security of India.
2. **The benefits of maintaining buffer stocks**
 1. Provides an effective price support to farmers.
 2. Meets social objective of distributing subsidised food grains to economically vulnerable sections of society.
 3. Acts as reserve to stabilise markets for basic food grains.
 4. Crucial for nutritional security and for implementing the National Food Security Act 2013.
3. **Present loopholes in procurement**
 1. Excess procurement, transportation and distribution costs adds to increasing subsidy burden. Compared to the mandated

requirement of around 25 Million Tonnes (MT) of buffer stock, FCI was holding around 55 MT of wheat and rice.

2. Since the storage is not commensurate with procurement, there is high degree of wastage due to climatic conditions, pest attacks, degradation, etc.
 3. Crowding out of private trade from the market. This has impacted prices in the open market in an adverse manner.
 4. 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.
 5. FCI has no control over MSP and issue prices. The successive governments have set the MSP high and issue price low as a populist measure. This has led to a increasing food subsidy.
 6. It has caused imbalances in the national production basket where pulses crop has become secondary choices for farmers.
 7. Diversions of grains from PDS amounted to 46.7 percent in 2011-12 based on NSSO's data.
 8. Despite having buffer stocks in much excess of stocking norms, this system has failed to remove malnutrition, and bring stability in food grain prices.
4. **Reforms in buffer stocking**
1. 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.
 2. Breaking FCI into two function specific agencies such as Procurement, Logistics and Distribution. This will increase the efficiency of FCI. Ex: Power sector.
 3. Need to provide greater flexibility to FCI to operate in Open Market Sale Scheme (OMSS) and export markets.
 4. 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.
 5. India needs more bulk handling facilities and better mechanisation in handling buffer stocks. For example, Cover and Plinth (CAP) storage needs to be used.

6. **Decentralised procuring** should be encouraged to cut distribution costs and also to cover more number of farmers.
7. There should be a **cap on MSP and issue prices** so that **food subsidy** doesn't increase too much.
8. As soon as the **stock required** for the implementation of Food Security Bill is procured, **Minimum Support Price (MSP)** should cease and private entities should be allowed to procure. Now FCI has almost double the requirement buffer stock. Capping procurement at the requirement level will vastly reduce food subsidy.

5. **Shanta kumar committee recommendations**

1. **Stop procurement from grain surplus states** like Punjab, Haryana, etc., because those states have well **experience** in manpower management and can procure grain for their own. Shift its focus to eastern **Uttar Pradesh, Bihar, Assam and West Bengal** whose State governments are inept and lack infrastructure to procure grains.
2. The FCI can purchase grain above its NFSA needs from surplus states, but the **actual purchasing** should be handled by the **states themselves**. Shifting procurement to eastern states will help fuel another green revolution.
3. The Government of India must provide **better price support operations** for **pulses** and **oilseeds** and dovetail their MSP policy with trade policy so that their landed costs are not below their MSP.
4. **Cash transfers in PDS** should be gradually introduced. The panel moots shifting to **cash payments** for inputs like fertilisers and rationalising the price of urea.
5. FCI should **gradually outsource grain storage function** to central warehousing corporation (CWC), state warehousing corporation (SWC), and **private sector**. Also **overhaul the grain storage function**. Don't store grain in cover and plinth godowns. Convert them into silos with **mechanised assemblies**.
6. The panel suggests amending the NFSA and **reducing the subsidised population** to 40 percent instead of the current 67 percent.
7. Immediately after the procurement, give 6 months **ration to poor beneficiaries**, with cheap grain bins for storage. FCI will have to

store less grain in its godowns. People themselves will take care of storage.

8. Report pushes for a national **warehousing system** under a PPP model to **reduce wasteful storage and transport costs**. Farmers can deposit their produce at these warehouses and receive up to 80 per cent of the MSP value of this produce from banks.

6. NITI Aayog reforms on MSP

1. **Awareness among the farmers** needs to be increased and the information should be timely disseminated till the lowest level.
2. To remove distortion in the MSP system, NITI has suggested the introduction of '**Price Deficiency Payment**' system. Under it, a subsidy would be provided on other targeted produce in case the **price falls below an MSP linked threshold**.
3. **Delay in MSP payments** have negative effects on the farmers which need to be corrected. **MSP** should be **announced well in advance** of the sowing season so as to enable the farmers to plan their cropping.
4. The **procurement centers** should be in the **village itself** to avoid transportation costs.
5. There should be meaningful consultations with the **State Government**, both on the **methodology of computation of MSP** as well as on the implementation.
6. The criteria of fixing **MSP** should be **current year's** data and based on more **meaningful criteria** rather than the historical costs.
7. **Improved facilities** at procurement centres, such as **drying yards**, weighing bridges, toilets, etc. should be provided to the farmers. **More godowns** should be set up and maintained properly for better storage and reduction of wastage.
8. The MSP scheme requires a **complete overhaul in those states** where the impact of the scheme ranges from **nil to at best marginal** to ensure that MSP continue to as an important instrument.

7. Arvind Subramaniam committee on pulses

1. **Encourage states to delist pulses from their APMC**.
2. **Eliminate export ban on pulses** and stock limits which coupled with weak procurement forces farmers to sell most of their output at market prices that are well below MSP.

3. Create a new institution as a **Public Private Partnership (PPP)** to compete with and complement existing institutions to procure stock and dispose pulses.
4. **Encourage development of GM technologies** and grant expeditious approval to indigenously developed new varieties of pulses.

Public distribution system

1. **The concept of PDS** in India emerged during **1942** as a result of **shortage of food grains** during World War. After independence in 1947, **major aim** of Government of India has been to **deliver food security to all**. With this objective, Public distribution system was started.
2. **Major goals of PDS**
 1. Make **goods available to consumers**, especially the **disadvantaged sections** of society at fair prices. Ensure **social justice in distribution** of basic necessities of life.
 2. Check and **prevent hoarding** and black marketing in essential commodities.
 3. **Even out fluctuations in prices** and availability of mass consumption goods.
 4. **Support poverty alleviation programmes**, particularly, rural employment programmes like mid-day meals, ICDS, etc.
3. **Progress in PDS**
 1. **Chattisgarh** made huge supply chain changes by adopting **de-privatisation of PDS shops, clear entitlements, grievance redressal system, GPS enabled transportation, doorstep delivery, tight monitoring** and surveillance. Through these reforms Chattisgarh was able to **restrict leakages below 5%**. Chattisgarh model was emulated by Odisha and others.
 2. According to the official data, **all the existing 23 crore ration cards** have been digitised and most of the cards have been seeded with Aadhaar numbers. The government has stated that 2.75 crore bogus ration cards have been deleted during 2013-17 which has ensured better targeting of beneficiaries.
 3. In order to ensure transparency in grain sale process in the PDS,

the **electronic Point of Sale (ePoS)** machines have been **installed in 3.88 lakh fair prices shops (FPSs)** out of nearly 5.33 lakh FPSs in the country.

4. But in case of cash transfers, **where a high level committee** had recommended **gradual introduction of cash transfers** in the **PDS**, starting with large cities with more than 1 million population; extending it to grain-surplus states, and then giving an option to deficit states to opt for cash or physical grain distribution; the progress has been minimal.

4. **Issues in implementation of TPDS**

1. **Identification of eligible households**. There may be inclusion and **exclusion errors** possible in targeted schemes.
2. Trends in **procurement** vis-a-vis production of food grains.
3. **Storage space** for food grains.
4. **Food subsidy** which is already huge.
5. **Leakage of food grains**.

5. **Limitations of PDS**

1. **There is no set criteria** for determining **BPL** and **APL** families. This leads to large **exclusion errors** and also increase corruption.
2. There is **huge black marketing in PDS**. Food grains are diverted by Fair Price Shops holder and mediator.
3. There are growing instances of the consumers **receiving inferior quality food grains** in the ration shops.
4. Many BPL families are not able to acquire ration cards either because they are seasonal **migrant workers** or because they live in **unauthorised colonies**.
5. **Lack of power to marketing officers** in **cancelling licence**, only higher authorities are competent enough to do so, which reduces the deterrent effect.
6. Poor **grievance redressal** due to poor empathy of administrator and influence of dealers.
7. Public distribution system includes **only few food grains** such as wheat and rice, it does not fulfil the requirement of complete nutrition.
8. **Uneven distribution** of food **generation, procurement and distribution**. For example, north eastern states are very far from

Punjab and Haryana, from where wheat is procured. To transport food grains from Punjab to far flung areas in North east will entail cost and time both.

6. Suggestions

1. A white paper should be prepared on the procedure for selection of BPL, and clear policy should be laid down by the Ministry of Rural Development.
2. FPS (Fair Price Shop) should be allotted to people who are already running a viable shop in the area. This will ensure that the shop remains open on all working days.
3. DBT can be introduced to reduce leakages and to improve service delivery.
4. Digitisation of ration cards can help in modernising the PDS. A number of states are already innovating in PDS implementation, and improved performance can be seen in some cases.

Decentralised procurement

1. DCP was introduced in 1997-98 with the objective of reducing cost of procurement, encouraging local procurement thereby extending benefits of MSP to local farmers and expanding procurement volumes.
2. Mechanism of DCP
 1. States undertake direct purchase of food grains on behalf of centre. They procure for central pool, store and distribute food grains for welfare schemes based on allocation made by centre.
 2. Surplus is handed over to FCI, while deficit is met by FCI directly. Centre meets expenditure incurred by states on procurement. It also monitors quality of food grains and helps to ensure smooth procurement. States are encouraged but not mandated to participate.
3. Problems
 1. Issue of bonus declared by few states over and above MSP. This distorts market, driving away private buyers, leaving entire responsibility of purchase only on Government. This has resulted in over procurement in these states.
 2. About only 6% of farmers sell their produce to government. Others are either unaware or lack access to MSP system. Majorly

big farmers in few states have benefited from MSP procurement system.

3. In last few years, **storage has been double the prescribed buffer limits**. It has led to **shortage in open market** and thereby inflation and wastage due to FCI's limited storage capacity.
4. About **40-60% PDS grains are siphoned** off to black market.
5. Procurement system is highly **skewed in favour of wheat and rice** which has negatively affected the production of other crops such as pulses.

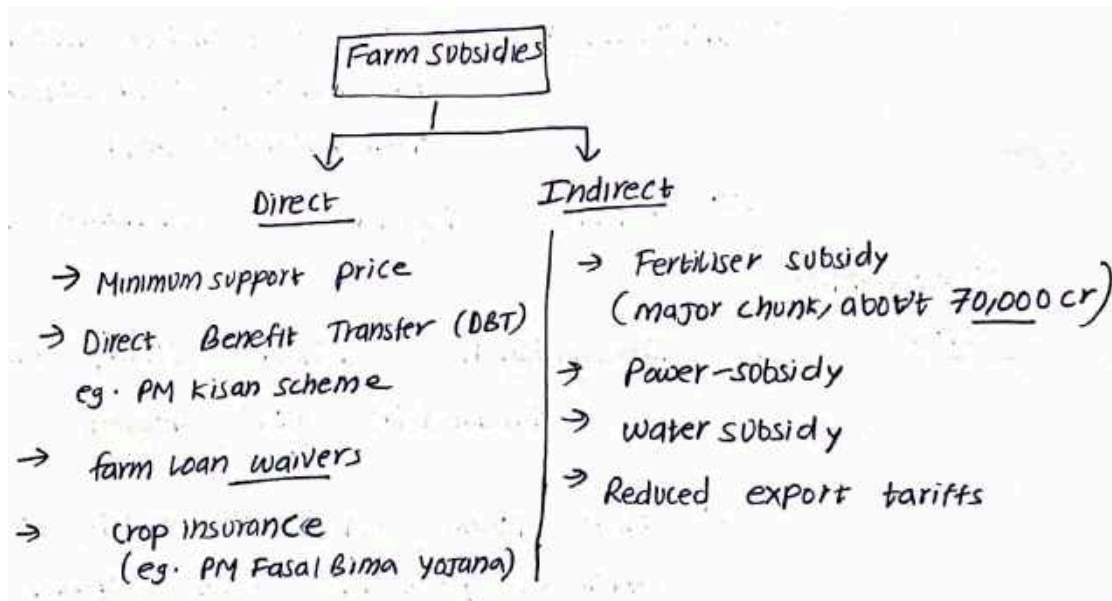
4. **What reforms can be made**

1. In **states where procurement system is robust**, procurement and distribution should be left to states while FCI should procure from other states.
 2. FCI should **sell stock** over buffer in open market.
 3. FCI should **gradually outsource grain storage** function to central warehousing corporation (CWC), state warehousing corporation (SWC), and private players.
 4. **End to End computerisation** and **online tracking** of entire system from procurement to retail distribution.
 5. **Implementing DBT** helps in curbing black market.
 6. If a **surplus state declares bonus above MSP**, centre should limit procurement for TPDS allocations of that State and provide acquisition and distribution subsidy to state accordingly.
 7. State will be responsible for disposal of **surplus and accrued financial burden**. Centre has taken steps in this direction.
 8. Currently procurement system is **open ended** i.e. government is committed to buy whatever farmers wish to sell. Gradual movement to closed-ended procurement process would help where government buys according to its distribution requirement.
 9. **Awareness and opening more purchase centres** to improve outreach of MSP-system.
5. These reforms require strong **political will** and spirit of cooperative federalism to implement and function. However, they can streamline procurement process, reduce wastage while catering to the need of food security and farmer welfare.

Farm subsidies

1. As per a report published by the **SBI**, central government currently spends around **₹981 billion in form of farm subsidies**, which is roughly **2.9% of India's GDP**. But India's agricultural subsidy is less than 10 percent of the market value of total agricultural production. It is far less compared to the developed countries.

2.



3. Different types of farm subsidies

1. **Fertiliser subsidy:** Distribution of **cheap chemical** or non-chemical fertilisers among the farmers. Fertiliser subsidy applies to fertilisers such as **Urea**, **potash**, phosphate, etc.
2. **Irrigation subsidy:** This may work through provisions of public goods such as **canals**, **dams** which the government constructs and charges **low prices** or no prices at all for their use from the farmers. It may also be through cheap **private irrigation** equipment such as pump sets.
3. **Power subsidy:** The electricity subsidies imply that the **government charges low rates** for the **electricity supplied** to the **farmers**. Power subsidy acts as an incentive to farmers to invest in pump sets, bore-wells, etc.
4. **Seed subsidies:** **High yielding seeds (HYVs)** can be provided by the government at **low prices**. The **research and development activities** needed to produce such productive seeds are also

undertaken by the Government.

5. **Credit subsidy:** For **good availability of credit** at rural areas Government has started more **banking operations** in **rural areas**. The **interest rates are also maintained low** through subsidisation schemes, and the terms of credit (collateral requirements) are relaxed for the poor.
6. **Price subsidy:** Through **MSP regime** Government promises to buy the crop from the farmers at a price which is **higher than the market price**. Such procurement by the government also has a long run impact. It encourages the farmers to grow crops which are regularly procured.
7. **Infrastructural subsidy:** Good roads, storage facilities, **power**, **information about the market**, **transportation** to the ports, etc., are vital for carrying out production and sale operations.
8. **Export subsidies:** When a farmer or exporter sells agricultural products in foreign market, he earns money for himself, as well as **foreign exchange** for the country. Subsidies provided to encourage exports are referred as export subsidies.

4. Positives

1. **Agricultural subsidies** particularly **MSP incentivises** production by farmers. Increasing production **leads to lowering of prices**.
2. Food security programmes benefits **poor consumers** as food is made much **affordable** through **PDS**.
3. It helps government to **focus on certain areas** and ensure their growth such as subsidies provided to solar electricity production and deployment.
4. Subsidies provided to **renewable energy** sector has led to making the technology **economically viable**. Large scale deployment of these technologies would lead to offsetting some of the impact of **climate change**.
5. **Support given to organic farming** through the Paramparagat Krishi Vikas Yojana would offset some of the soil damage caused due to increasing use of pesticides and fertilizers.

5. Negatives

1. It leads to increased **wastage and over exploitation**. Subsidised electricity for water pumps in Punjab has led to **rapidly declining water tables** in Punjab.

2. It leads to increased **fiscal deficit**. This is especially true for subsidies which the economic survey calls as **subsidies for the rich**. This has the effect of crowding out of private investment.
 3. MSP also leads to **increased inflation**.
 4. Subsidies also lead to **distortion of market forces** based on supply and demand. For instance, subsidies provided for urea has **led to overuse of urea**.
 5. **It has skewed cropping patterns**. High MSP prices for rice and wheat has shifted production towards them.
 6. Subsidies provided on petrol and diesel lead to their unmitigated use which leads to **environmental damage**.
6. **Way forward**
1. India and China have demanded the developed nations at WTO to cut down the farm subsidies under the agreed multilateral trade rules. In WTO parlance, the subsidies are called Aggregate Measurement of Support (AMS) or Amber Box support.
 2. India and China believe that elimination of AMS should be the starting point of reforms rather than seeking reduction of subsidies by developing countries.

Taxing agriculture

1. **Income tax act 1961** exempts **agricultural income from being taxed**. Recently NITI Ayoog has recommended for some form of agriculture taxation.
2. **Benefits of taxing agricultural income**
 1. It will **increase the Tax to GDP ratio**, which is 16.6% when compared to 35% in OECD countries. The tax base in India is around **1.5% of the population only**.
 2. **Rich farmers** above an income threshold can be taxed which will be a step towards **economic equity**.
 3. It would **curb evasion of taxes** by falsely showing income as agricultural income.
 4. Taxation requires **systematic maintenance of accounts** which would help the farmers to secure need-based **loans on documented records**.

5. It will help banks to reduce **NPAs**, as they will have **clear idea of defaulters**.
6. It helps Govt to **target schemes** such as MNREGA to small farmers. Account keeping will help the Government to **track the improvement and growth** in the agricultural sector.

3. Concerns

1. Agricultural income is highly **monsoon dependent** and therefore taxing agricultural income may become a **negative externality**.
 2. **Can create a panic among small farmers** who does not have understanding about tax system. Farmers will face huge difficulty in understanding the tax policy and filing tax returns.
 3. **Fragmentation** of lands among family members will take place to avoid taxes.
 4. Taxing of agricultural income can lead to **increase in prices to maintain the profits**.
 5. **High income** can project **land lords as good farmers** in front of banks as compared to small farmers.
 6. **Establishing an institutional framework** and implementing the tax system in the rural areas with the available resources is a **huge task with the existing infrastructure** and man power available.
4. There is a need of prioritising the **data collection on farmers' incomes**. The data needs to be collected at the **village level** and then a threshold can be set to tax the agricultural income. Considering alternatives like **integrating farmers with crop insurance** system and tracking those records to access the productivity of the lands can be an alternative while the required infrastructure is being developed.

APMC

1. **State governments enacted APMC** act in 1950s or so to bring transparency and end discretion of traders. This was directed toward ensuring **food security, remunerative prices to farmers** and **fair prices to consumers**. However this act has worked contrary to almost every stated objective.
2. Under the APMC acts, **States are geographically divided** in to markets which are **headed by market committees** and any production in that area

shall be brought to a market committee for sale. This is applicable to **notified agricultural products** which differs from state to state. In this **Mandi** there are commissions agents who **hold license** and are allotted a shop in the market.

3. Shortcomings in APMC

1. **Monopoly** of any trade is bad, whether it is by some MNC corporation by government or by any APMC. It **deprives farmers from better customers**, and consumers from original suppliers.
2. It is quite often seen that agents in an APMC get together to form a **cartel** and deliberately restraint from higher bidding. Produce is **procured at reduced price** and sold at higher price. Spoils are then shared by participants, leaving farmers in lurch.
3. **License fee** in these markets are highly prohibitive. In many markets farmers were not allowed to operate. Further, **license fee is quite high** which keeps away competition. At most places only a group of elite operates in APMC.
4. APMC play **dual role of regulator and market**. Consequently its role as regulator is undermined by **vested interest** in lucrative trade. They despite of inefficiency **won't let go any control**. Generally, member and chairman are nominated out of the agents operating in that market.
5. To **avoid tax**, some traders **do not give sale slips** to farmers. As a result, it is difficult for the farmer to prove his income to **get loans** from banks.
6. Agents have **tendency to block a part of payment** for unexplained or fictitious reasons.

4. Model APMC

1. **Farmer doesn't need to bring his produce** to APMC Mandi. He can directly sell it to whomever he wants. It allows alternate markets such as direct purchase centers, private market yards.
2. It **increased responsibility of APMCs** by mandating payment should be made on day of sale itself. Also **quantity brought and prices** should be **displayed** at the **gate**.
3. It allows **PPP** in the management and development of **agricultural markets** in the country for **post-harvest** handling, **cold storage**, **pre-cooling** facilities, pack houses etc.
4. It not only allows, but strongly advocates for **contract farming**. It

also provides for dispute resolution mechanism. It provides **abolishment of commission agent** system. Payments will be made for facilities such as grading, sorting, and processing. It also ensures transparency in pricing and transactions in the market.

5. **Not all states adopted** the Model APMC Act. Because of vested interests of various pressure groups such as middleman and traders. Model APMC act is not uniformly adopted, states have made their own modifications.
6. Some states have also created **entry barriers** by prescribing either prohibitive license fees for setting up such markets, or the minimum distance between private markets and APMC markets.

5. Other reforms

1. **Horticulture should be specifically excluded** from definitions of APMC. Because Mandis are main culprits for inflation and wastage of fruits and veggies.
2. All APMCs Mandis should introduce **electronic auction** platform. This can put an end to cartelisation.
3. **Open membership of APMC** by encouraging wholesalers and **retailers** to enter into transactions with the growers. This will **reduce middlemen** and reduce final prices.
4. **Anyone should be allowed** to trade in **APMC market**. Licensing system should be abolished. The APMC Market Committee should only fix the transaction fee and keep a Bank Guarantee from traders to ensure that the farmers' payment is not affected.
5. Encourage **farmer's market**, where farmer can sell his produce to final consumers. Ex: **Rythu bazar** in Andhra Pradesh, Apni Mandi in Punjab. Initiatives like ITC e-choupal have significantly improved farmer's income.
6. Encourage **Virtual Markets**. Example of such virtual markets are Future exchange, **Spot Exchange, Warehouse Receipt System** and Web Marketing. In these Farmer will first deposit his produce to a nominated warehouse and gets a receipt. **This receipt can be traded** by the participant on the e-mandi across the country.

National Agricultural Market (NAM)

1. As per the economic survey, **India has around 585** regulated primary

agriculture markets. These are governed by respective APMC act of the states, which have led to **market segmentation**, etc. **NAM is an online platform** with a physical market or **mandi at the backend**. NAM seeks to leverage the **physical infrastructure** of mandis through an online **trading portal**, enabling buyers situated even outside the state to participate in trading at the local level.

2. Need for national markets

1. In addition to the **levies charged by the states**, **commission agents** charge a **market fee**. Thus, it is a **double whammy** for farmers. These **distort markets**. The integration of all major mandis into the NAM e-platform would ensure common procedures for issue of licenses, levy of fee and movement of produce.
2. APMC markets are responsible for **cartelisation** of produce, **exploitation** of farmers. NAM increases the choice for a farmer at the mandi. Local traders and also traders on the electronic platform sitting in other States can bid for the produce.
3. With elimination of middlemen, the **share price for farmers will increase**. National market will increase the bargaining power of the farmer.
4. The NAM will also **facilitate** the **emergence of value chains** in major agricultural commodities across the country and help to promote **scientific storage** and movement of agricultural goods. Respective APMC mandis will have to ensure quality standards of agricultural goods sold through the e-platform.
5. A state regulatory authority to oversee the mechanism for **payment receipts** will help **farmers secure agriculture credit** from banks under various schemes.
6. **Scope for contract farming** whereby a farmer may be supplied with the best technologies funded by big corporates.

3. Other problems in agricultural marketing

1. **Technology illiteracy:** Farmers need to be **digitally educated** to reap benefits of e-NAM. **Rural areas lack technology infrastructure** and connectivity solution can be bridging it with digital India.
2. **Infrastructure:** Need of infrastructure for connectivity (**Rurban clusters**, Gram sadak yojana, waterways), **warehousing** (cold storage), **grading**, value addition through **food processing** etc.

3. **Agriculture in state list:** Many states fail to implement the guidelines of centre Eg: **Model APMC** act , eNAM are still not adopted by all states.
 4. **Lack of credit facilities:** Due to which a **farmer has to sell his produce immediately** after the crop is ready. Adequate credit facilities can enable him to withhold his produce and run his household till he gets a better price.
 5. **Lack of market information:** By way of prevailing condition in the market as well as **prices prevailing**.
 6. **WTO agreement:** Need to **focus on subsidy issues** for betterment and protection of agriculture market from overseas competition which require changes in changes in trade and commerce.
4. **Measures to reform marketing**
1. **e-NAM to connect all APMC mandis** across states through an electronic portal, thus benefitting both farmers and consumers.
 2. **Model Agricultural Produce and Livestock Marketing Act, 2017** to assist **farmers to directly connect buyers** to enable them to discover the optimum price for their commodities.
 3. **Model Contract Farming and Services Act, 2018** to **integrate farmers with bulk purchasers** including exporters, agro- industries etc. for better price realization through mitigation of market and price risks to the farmers and ensuring smooth agro raw material supply to the agro industries.
 4. **Gramin Agricultural Markets (GrAMs)** so as to promote **22,000 number of retail markets** in **close proximity of farm gate**.
 5. **Agriculture export policy, 2018** which aims to double agriculture exports from \$30 billion to \$ 60 billion by 2022.
 6. Pradhan Mantri Annadata Aay SanraksHan Abhiyan (**PM-AASHA**) to ensure remunerative prices to farmers for their non-rice and non-wheat produce.
 7. Development and Strengthening of Grading and Standardization System: Assigning '**AGMARK**' to graded products which ensure good quality and also command a **better price in the market**.
 8. **Farmer Producer Organisation (FPO):** SFAC has been promoting Agri-Business by encouraging institutional and private sector investments and linkages to ensure the empowerment of all

farmers in the country.

9. **PM Kisan SAMPADA Yojana** for creation of modern infrastructure with efficient supply chain management from farm gate to retail outlet.

5. Challenges in e-NAM

1. Introduction of **NAM does not necessarily** lead to **disintermediation**. In e-auction mandis such as Gulbarga, **commission agents** are still vital actors in the process, from sampling to dispatch.
2. **Problems of grading and standardisation of crops** being sold through NAM is an issue.
3. **Middle men** provide real and substantive **services** such as **credit facilities** and **crop loans** to farmers in a timely manner. The farmers dependence on them is mutually beneficial. It needs to be **regulated and not abolished** altogether.
4. Implementation of NAM requires **states support**. The overbearing presence of **state politicians in APMC** raises questions whether the states will be willing to reform their APMC Act and implement NAM properly.
5. **Electronic trading** has been limited to **respective mandis within a state** meaning farmers cannot yet access sellers outside the mandi, be it within the state or across the country.

6. Model APMC has two serious limitations

1. First, the **contract sponsors** or the private entities setting up markets are required to **pay the market fee** to the APMCs, even if they provide no services. This is akin to the tax charged by the APMC.
2. Second, though the model APMC act provides for the **creation of markets by private sector**, it is inadequate to create competition. The **owner of the private** market still collects the **APMC fees**, for and on behalf of the APMC, in addition to the fee that he might charge for **providing trading platform and other services**, like loading, unloading, grading, weighing and so on.

7. Road map for creating national market

1. One possibility would be to **incentivise** the **states** (NITI transfers) to **drop fruits and vegetables** from the APMC schedule of regulated commodities.

2. **Create state wide common markets** by providing for common registration of market intermediaries across market yards within the state on the lines of the **Karnataka model**.
 3. Provide **policy support** for setting up of **infrastructure**, making **land available** and so on for alternative or **special markets in private sector**, since the players in the private sector cannot viably compete with the APMCs.
 4. **Liberalisation of FDI in retail** could create the possibilities for filling in the investment and **infrastructure deficit** which results in supply chain inefficiencies.
 5. Innovative solutions taken by Karnataka like **NCDEX** (National Commodity and Derivatives Exchange) Spot Exchange for **automation of auction process** in **mandis**, **Rashtriya e-Market Services (ReMS)** etc., can be followed in other states.
8. **Issues in storage and transportation infrastructure**
1. **Regional disparity of storage capacity: 64% of FCI infrastructure** is located in the **large procurement states like Punjab**, Haryana, Andhra Pradesh, Uttar Pradesh and Chhattisgarh.
 2. **The poor condition of storage facilities: Warehouses infrastructure is poorly built** which may sometime lead to water percolation through ceiling and walls, which damage the produced. **Inadequate infrastructure for storage. Skewed distribution of this capacity** is another issue, with North India having access to 60% of the total storage infrastructure.
 3. **Low private investment:** Due to low returns on investment, this sector is **less attractive to private companies**.
 4. **Lack of cold storage infrastructure:** Most existing **cold storages are single commodity storages**, resulting in their capacities lying idle for up to six months a year. The cold-chain infrastructure is also unevenly distributed among states. **Lack of refrigerated Trucks:** Low investment is seen in refrigerated trucks which is a must for cold storage logistics.
 5. **Poor road connectivity: Road connectivity is weak, especially in hilly areas.** Poor maintenance of rural roads is a major constraint as well. Especially in case of a perishable item, it causes huge loss to farmers.

6. **Cost:** The transportation and storage cost in India is very high compared to developed countries. High cost reduces the competitiveness of Indian agricultural produce both in domestic as well as the export market.

9. Government initiatives

1. **PM Gram Sadak Yojana** to connect the hinterlands for better transport connectivity.
 2. **Operation Greens** to promote agri-logistics, processing facilities and professional management. But it is only to seek to stabilise the supply of **Tomato, Onion and Potato (TOP) crops**, excluding other farm produce.
 3. The **Private Entrepreneur Guarantee Scheme** to incentivise private investment for construction of warehouses, with an FCI guarantee to hire them for 10 years, assuring a fair return on investment by the entrepreneur.
 4. **Tax incentive is given to private players** so they take an active interest in this sector.
 5. The **Warehousing Act** which will promote negotiability of warehousing receipts.
 6. Inclusion of agri-warehousing under **priority sector lending by RBI**.
10. Unless some very drastic measures are taken to improve the **storage capacity of food grains**, the wastage of food grains cannot be curbed which otherwise could be utilized for feeding millions of poor people and to achieve **SDG 2**.

Food processing

1. **Any form of value addition in food** in the form of **sorting, grading, packaging, branding** etc., is called food processing. **Food processing** not merely adds value to the agro products, but **also increases their utility**. **Only 2% of the food** is processed in India.
2. **Problems of food wastage**
 1. **About 20 crore people go to bed hungry** and **7,000 people die of hunger** every day. Wastage of food is not less than a social delinquency.

2. India loses **Rs. 58,000 crore every year** because of wastage of food.
3. The energy spent over wasted food results in **3.3 billion tonnes of carbon dioxide production every year**. Decay also leads to harmful emission of other gases in the atmosphere.
4. The wastage of food entails loss of **considerable amount of resources** in the form of inputs used during production.

3. Advantages of FPI

1. FPI is **employment intensive** industry. Much of the employment will be created into **rural India**. This can remedy problem of distress migration. The **sector employs almost 13% of the workforce in the organised sector** and 13.7% of the workforce in the unorganised sector and **contributes 9% of manufacturing value addition**.
2. India is **net exporter of agricultural products**. But value addition of Indian product remains quite low. Food processing industry can increase our **export potential**.
3. 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.
4. It can reduce **food wastage** and can enhance nation's **food security**. Food processing can **reduce packaging, transportation** losses. In fact, 30% of production is wasted (post-harvest losses) which comes out to be around Rs. 58,000 crore annually.
5. It will help develop **vital linkages between industry and agriculture**.
6. Growing **urban culture, nuclear families**, working couples and purchasing power makes case for processed food. Consumption in India is gradually tilting towards packaged and **ready to eat foods**.

4. Obstacles to food processing

1. Most of our food processing units are **small scale**, which leads to problem of poor economies of scale.
2. **Low level of linkage** between the industry and the farmers for the raw materials.
3. **Multiplicity of laws and rules** which leads to contradictions and

delays. Taxes on processed food in India are among the highest in the world.

4. **High cost of raw material** and presence of intermediaries due to **APMC acts**.
 5. There is lack of faster and efficient **transportation**, leads to wastage of agricultural goods. **Inadequate cold chain infrastructure** and inadequate **logistics**. Only 10% of food is covered by cold storage facilities in India.
 6. Indian agriculture **focuses on traditional crops** rather **commercial crops** desired by the market. Variation in quality is another impediment.
 7. Insufficient number of **laboratories**. Most laboratories at sea ports are not fully **equipped** to handle testing of imported products. **Lack of trained manpower**. Only very few universities offer special courses for food processing and entrepreneurship.
 8. **Indians prefer freshly cooked products** as compared to packaged products. because of traditional mindset.
5. **Aims of National mission on food processing**
1. Enhancing **capacity** of food processing industries through **new technologies**. **Modernisation of food processing** industries.
 2. **Establishing of mega food parks**, integrated **cold chains** and preservation and modernization of abattoirs.
 3. Improving the **quality of food products** as per the international standards. Encouraging the **FPI to adopt food safety and quality assurance mechanism** such as **Total Quality Management (TQM)**.
 4. **Reduce wastage** of agricultural produce.
 5. It also has provision for promoting **skill development**, **entrepreneurship** and **training in post-harvest management**.
6. **Draft National policy on food processing, 2017**
1. It advocates adoption of sustainable environmental practices like **energy generation from bio-waste**.
 2. For Quality, health and safety of products, the policy suggests compliance with **FSSAI Act 2006**.
 3. States should create an **e-platform** to **facilitate all the clearances** in a time bound manner.
 4. The policy recommends following a **cluster approach** to tap the

benefits of economies of scale in food processing.

5. **Ceiling on Land Lease** act should be raised or abolished to encourage entrepreneurs procure lands for bigger units. Land should be allotted on priority to **Mega food parks (MFP)**.
6. **Technology adoption** like barcoding, **RFID tags** etc. should be supported. It also aims to promote entrepreneurship in this sector by reforming **labour laws**, promoting **incubation centres**, setup **skilling centres** in each state etc.

7. Crop Colonies

1. Chief Minister K. Chandrasekhar Rao asked the officials to come up with **plans to divide cultivable land** in the State into crop colonies so as to **establish food processing units** not only to make value addition to the produce of the farmers and ensure them improved income but also to provide **unadulterated and quality processed** foods at competitive prices.

8. Upstream and downstream integration

1. **Suppliers to a producers lie on upstream side**, where as **customers lie on downstream** side. This will change according person under observation. For a farmer, supplier of **seeds and fertilisers lie on upstream**, while cold store owners, farm contractors, mill owners, traders in agro output lies on downstream.
2. When a particular person in supply chain **assume role of two levels** it is said integration.
3. **Backward integration** involves company expanding its activities to **upstream areas**. Company aims to get raw material at cheap rates, **uniform quality**, steady supply and eliminate any middlemen. Ex: **Amul sets up dairy farmers cooperative** in villages to collect milk.
4. **Forward integration** refers to company expanding its **activities to downstream areas**. Company aims to get more control over sales, consumer-contact and eliminate any middlemen. Ex: **Nike, Adidas, Apple** have their own retail outlets in big cities.
5. When company's backward and forward integration is so good that it practically **runs everything** from making **raw material to selling final product to final customer**. For example, oil giants such as Shell have their own oil wells, refineries and retail petrol pumps.
6. In farming and food processing, **vertical integration can work**

wonders. For this farmer needs financial and technical support. Agriculture in India already is over employed. This with **seasonal nature of majority of farming crops** gives farmers a compelling reason to get into food processing business.

9. Health effects

1. Brands such as Maggi have positioned themselves as a **quick fix to hunger** especially in case of urban India living a fast lifestyle. In such context, the excess of **Lead found in Maggi** last year which leads to diseases like Painter's Colic, damage to neural system etc pose a huge risk.
2. Such food are rich in **sugar content** thereby leading to diseases such as **diabetes, obesity**, etc.
3. **Trans fat** contained in such food items leads to obesity and **heart issues**.
4. The **packaging on processed food** products is often misleading. For instance, **Red Bull**, an energy drink contains huge dosage of caffeine and sucrose having harmful effects.
5. The **issue of false advertisement** was in news in India recently when the question of **celebrity liability** was raised during the **Maggi controversy**.

10. How Government can regulate it

1. FSSAI currently goes for **individual testing** of each processed food item for which it does not have adequate capacity. Instead it can follow the **US model** where the Food Safety Authority **approves ingredients** to be added across the range of products.
2. There is also a need to promote the **more nutritious** jowar, bajra, ragi with enhanced impetus to the already functioning **Nutri-cereals scheme** under Rashtriya Krishi Vikas Yojana.
3. The government can also follow the **Kerala model to impose a fat tax** (sin tax) on food items which are harmful for health.
4. There is a need to **create awareness** about the importance of well **balanced diet** as more and more youngsters have now started becoming dependent on junk food and processed food.

11. Mega food park (MFP)

1. Mega food parks are to be based on **cluster approach**. In India there are regional **horticultural crops**, which are **dominantly** grown in a particular area. In these areas there is generally **cluster of**

similar farmers, factories, and traders etc., who dominantly deal in same agricultural product.

2. Scheme aims to strengthen such clusters by providing world class infrastructure facilities. This will result in smoothening of supply chain from farm to market.
3. Hub and spoke model is adopted, as per which there will be a strong Central Processing Centre (CPCs), which will cater needs of surrounding areas. In surrounding areas, there will be smaller primary processing centers (PPCs) which will be fed from numerous collection centers (CCs).
4. These collection centers will have direct interface with the farmer, farmer groups, or self-help groups. This will lead to vertical integration in activities of that particular area.

12. Benefits of Mega food parks

1. Will benefit 6000 farmers directly and 25000-30000 farmers indirectly.
2. The clearly demarcated task domains reduces confusion and increases efficiency.
3. Will generate nearly 40,000 direct and indirect jobs in the form of industrial work force, people employed in supply chain, etc. It has potential to reduce rural-urban migration, as it creates jobs in rural areas.
4. Will accommodate 30-40 food processing industries in it and will have annual turnover of 500 crore.
5. Will provide efficient supply chain management from farm gate to retail outlet, which will reduce farmers operational costs as farmers can utilise the cold storages, ripening chambers and ware houses.
6. Good transportation facilities such as reefer trucks and vans.

13. Agri Export Zones (AEZ)

1. To give thrust to export of agro products, new concept of Agri export zones was brought in 2001. APEDA has been nominated as the Nodal Agency to coordinate the efforts on the part of Central Govt. negotiations.
2. The cluster approach of identifying the potential products and geographical region in which these products are grown.
3. Adopting an end-to-end approach of integrating the entire process right from the stage of production till it reaches the market. There

would also be a need to identify problems encountered at each stage.

4. **Identification of such potential crops** is responsibility of state governments. Projects in such areas for identified crops will be eligible for financial assistance and certain fiscal incentives.

14. **Problems in agri-export zones**

1. **Government agencies don't take ownership** or responsibility.
2. **Villagers and field officers are unaware** about the scheme and its conceptual framework.
3. The design of AEZ itself doesn't have **project orientation**.
4. **Lack of coordination or monitoring** in AEZs.
5. The **investment made by central and state** government has not materialised into real useful assets on the ground.
6. **Indiscreet proliferation of AEZs** in certain states. WB, Maharashtra have multiple Agro export zones while Odisha barely got one AEZ and that too in 2013.

Fertiliser policy

1. **Economic survey** has mentioned that the **fertiliser usage** in India is more than **3 times** that of other developed countries.
2. **Government interventions in urea sector**
 1. **Controlled MRP: Government fixes MRP for urea** to be sold to farmers. It has to reduce prices.
 2. **Production subsidy: 30 specific urea manufactures** are given subsidies on cost plus basis i.e. only these plants are subsidised to the extent of their cost of production above certain threshold. It is done for **self sufficiency**.
 3. **Canalisation: Import restrictions**, where only **3 agencies** are allowed to import urea and they are subsidised for imports.
 4. **Physical control: About 50% of urea is directed i.e government controls how much to import and where to sell.**
3. **Major distortions in fertiliser sector**
 1. Since **urea is subsidised only for agriculture**, 41% subsidised urea is diverted to **black market** for industry and across neighbouring countries.

2. The prices of urea are highly regulated in India (subsidy of 0.7% GDP), on the other hand other nutrient fertilizer like Potash and Phosphate have high costs. This leads to over utilisation of urea and **neglect of potash and phosphate**.
3. Similarly **neglect** towards **micronutrients** is also attributed to pricing policies.
4. **Restricted import or canalisation** leads to shortage when fertilizer demands are misestimated. This leads to black marketing.
5. Since **subsidy cost is provided to manufacturers**, they don't have any incentive for cost reduction and introduce efficient technology.
6. Further **pricing policies** are helping **big farmers** and **causing disparity** among states. Eg: High use in Punjab. At the same time, **small farmers** have to pay a **heavy price** for **black marketed** urea.
7. There is large scale **unawareness** among farmers regarding **judicious fertilizer** use. **Even NPK ratio of 4:2:1** which was publicised for long by government is found to be inappropriate for all regions as per report of Indian Council of Agricultural Research (**ICAR**).
8. Even government steps in **New Urea Policy 2015** like uniform gas pricing for all urea manufactures and **mandatory Neem coating of urea** though welcome but are aimed at Urea alone.

4. Reforms required

1. **One product one price:** The **75 percent subsidy on agricultural urea** creates a strong incentive to divert urea to industry and possibly across the border to Bangladesh and Nepal.
2. **Decanalising urea imports:** Allowing more agencies to **import urea** and giving them more freedom in procurement decision would allow flexibility in adjusting to demand.
3. **Urea under nutrient based subsidy:** **Nutrient based subsidy (NBS)** scheme would incentive firms to reduce cost and become more efficient.
4. **JAM trinity:** Use **JAM trinity** to check leakages and **improve targeting**.
5. **Soil health cards:** Introduction of **Soil Health Cards (SHC)** for scientific soil requirements is a welcome move. To promote **organic farming** Government has launched **Paramparagat Krishi**

Vikas Yojana.

6. **Neem coated urea:** Neem Coated Urea to **check diversion of urea** from agriculture uses. It also reduces leaching of nitrogen into soil.
 7. **Gas price pooling:** Under this, **price of domestic natural gas is averaged** or pooled with cost of imported LNG to create a uniform rate for fertilizer plants.
 8. **Micronutrients:** Encourage use of micronutrients by **awareness** programmes.
 9. **Cap on subsidies bags:** **Small farmers** would still be able to get all their urea at subsidised prices but large farmers may have to pay market prices for some of the urea they buy.
5. **Reforms of fertiliser sector** would not only help **farmers** and improve efficiency in the sector but also show that India is prepared to overcome **exit barriers**. **Rationalising subsidies** would also enable the Government to spend on more productive areas like drip irrigation, PM Gram Sadak Yojana etc.
6. **Suitability of fertiliser sector for DBT**
1. Fertilizer sector has high leakages of about **40%**. DBT can help in prevention of leakages.
 2. Central government control over fertiliser sector is high. This minimises **administrative complexity**.
 3. Government has a real time **Fertilizer Monitoring System (FMS)** that monitors the fertilizer supply chains.
 4. Economic survey considers it ideal to introduce DBT in fertilizer sector with **BAPU**, etc.
 5. With respect to fertilizer subsidy, the **beneficiaries and entitlements are not clearly defined**.
 6. Subsidy in case of Urea is more than half its MRP. Therefore, farmer may be **burdened financially to give MRP** and subsidy upfront to receive the DBT afterwards.
 7. **Significant part of cultivation** is today done by **tenant farmers** or sharecroppers not owning the land and without any formal **lease agreements**. If DBT is effected, there is no way tenant farmers can access subsidy.
 8. **Selecting criteria for capping** the number of bags on which the subsidy is payable, based on a reasonable assessment of

requirement. Capping would depend on the **specific fertiliser** as well as the crop and location where it is grown making it **more complicated** than the DBT for LPG.

Technology missions

1. **Technology missions** are **Government policies targeting specific sectors** for achieving the set objectives by **leveraging technology**. The GoI has launched various technology missions in agriculture sector targeting various crops like **oil seeds, pulses, maize, post harvest** technology, etc.
2. Support is provided by the Government in the form of **subsidies**, promotion, **credit linked subsidy, soft loans**, etc. Some technological missions include missions on citrus fruits, coconut, oilseeds.
3. **Importance in agriculture sector**
 1. **Better yield:** **Productivity is extremely low** due to lack of irrigation facilities, quality of seeds, fertilisers, etc. For example, **technological mission in coconut** has led to an **increased output** and India leading suppliers of world.
 2. **Affordable:** To large population due to Government initiative. Ex: **Technological Mission in oilseeds** have led to large scale oilseed production in diversified categories.
 3. **Promote R&D:** By **further investments**, and impetus in developing related technologies.
 4. **Remote sensing:** Helps in **development of modern technology** such as **remote sensing** etc.
4. **Various mission post-independent India**
 1. **Drinking water mission:** The idea was to **use satellites and the disciplines of geology**, civil engineering and biochemistry for **identifying, extracting** and cleansing water supplies. The mission also included an effort to **educate people how to repair** broken pumps.
 2. **Immunizations:** In 1987, India had the **highest amount of polio in the world**. They **developed a cold chain** for handling the **vaccines** with industrialists to get refrigeration to all parts of India. Several years later, **India** was producing **all of their own vaccines**. 25 years later, in 2013, India was declared polio-free.

3. **Literacy:** The literacy mission was aimed at attacking the serious **problem of mass illiteracy**. This was to be achieved by making use of and extending the **television network in rural areas**, as well as by using video and **audio cassettes** and other methods.
4. **Oilseeds:** India was **importing one billion dollars** of cooking oils each year, when **large portions** of Indian land are well **suited** to growing oil crops. **Farmers did not grow** these crops as they were **less profitable**. Once the intervention on oil was complete, India was exporting oil cakes at the rate of 600 million per year.
5. **Telecommunication:** The official goal of the telecom mission was to **improve service, dependability, and accessibility** of telecommunications across the country. This was through **indigenous development**, local **young talent**, rural telecom, digital switching networks, **local manufacturing** and privatization. The official goal is to bring one telephone to every part of the country.
6. **Dairy:** The goal of the dairy mission was to develop and implement technologies to improve **breeding, animal health, and fodder and milk production**.

Loan waivers

1. Farm loan waivers are **one time exercise to relieve farmers** from distress of loan repayment. Such waivers not only delays the long term solution but aggravates the problem by posing a challenge to state resources. The **Economic Survey** warned against farm loan waivers, saying if all states start offering them, the **total burden could swell to Rs. 2.7 lakh crore**.
2. **Arguments for loan waivers**
 1. Along with MSP hikes, it supports **rural demand**.
 2. Rising incidents of **farmer suicides** due to mounting debt can be reduced.
 3. Farmer's **social distress** is increasing and leading to **violent clashes**, law and order issues and mental challenges. Ex: Farmers violent agitation in MP.
 4. Lack of profit due to rise of input costs, international **crashing of commodity prices**.

3. Arguments against loan waivers

1. Increase **fiscal deficit** of states and will breach individual deficit targets. It may lead to **diversion of funds from capital spending**. Recently **Uttar Pradesh** which has slashed capital expenditure by 13 percent to accommodate the loan waiver.
2. It covers only a **tiny fraction of farmers** and that too with serious **exclusion and inclusion errors**. It excludes **agricultural labourers** who are even weaker than cultivators in bearing the consequences of economic distress.
3. It severely **erodes the credit culture**, with dire long-run consequences to the banking business. It **disincentivise** even those who are **capable of repaying loans**.
4. In many cases, **one household has multiple loans** either from different sources or in the name of different family members, which entitles it to multiple loan waiving.
5. **Politicisation of loan waivers** and promote short term thinking approach.
6. It provides only a **partial relief** to the indebted farmers as about **half of the institutional borrowing** of a cultivator is for **non-farm** purposes.

4. Better solutions

1. A more inclusive alternative approach is to **identify the vulnerable farmers** based on certain criteria and give an equal amount financial relief to the vulnerable and distressed families.
2. **Improved technology**, expansion of **irrigation coverage**, and **crop diversification** towards **high value crops** are appropriate measures for raising productivity and farmers income.
3. We need to raise income from agricultural activities and **enhance access** to **non-farm sources of income**.
4. **APMC, MSP and NAM** reforms for **higher profitability** and at least 50% higher price over cost of production. Price deficiency payment should be introduced.
5. Opportunity for **contract farming**, export of agriculture produce for attracting investment and higher returns.
6. **Empowering SHG**, Gram Sabhas for developing and **watching credit quality of farmers**.

5. **Loan waiver is only a sub-optimal solution** not intended to solve the **root cause of agricultural distress**. Moreover, it would further **put a dent on credit culture of farming community**. A holistic action framework ranging from front end to back end support for agriculture is need of the hour.

PM-AASHA

CA-4.2
① Madhan Mantri Annadata Aay Sanrakshan Abhiyan (PM-AASHA)

→ Scheme

→ PM-AASHA is a procurement policy with 3 subcomponents. States will have the choice of three schemes to choose from to compensate farmers. This scheme will complement the existing schemes of Dpt of food & Public Distribution for the procurement of paddy, wheat and other cereals and coarse grains where procurement is currently being done at MSP.

- 1) Price support scheme - Procurement would be done by central agencies like FCI, NAFED etc. Pulses, oilseeds and copra would be physically procured by them.
- 2) Price Deficiency Payment - Farmers selling their crops in recognised mandis within the notified time period would be paid the difference between the MSP and actual selling price.
- 3) Private Procurement and Stockist scheme - Private players are allowed to procure crops at MSP when market prices drop below MSP. Govt would compensate pvt procures by way of service charge which can go upto max. of 15% of the MSP.

→ Issues

- 1) Farmers are demanding MSP plus 50% profit
- 2) Farmers criticise the move as to slowly replace public procurement with pvt procurement
- 3) The Price Deficiency Scheme of MP - Bhavantar Bhugtan Yojana has not been successful
- 4) No focus on strengthening market infrastructure which is a pre-requisite for the success of the scheme
- 5) India's major problem is disposal of the stocks procured
- 6) As per Shankar Kumar Committee only 6% of the farmers are benefiting from procurement prices
- 7) No focus on improving the coverage; For Eg; studies revealed that around 62% of the farmers are not aware about MSP
- 8) The scheme may lead to market distortion

→ Shantakumar Committee

- FCI should handover procurement operations to states that gained sufficient experience in this regard
- Negotiable Warehouse receipt system (NWRS) should be taken up
- Revisit the MSP policy
- FCI should outsource its stocking operations to various agencies viz CWC
- Covered and Plinth storage should be gradually phased out

→ NITI Aayog

- NITI Aayog proposed that states should be given option of 3 models for procurement
 - 1) Market Assurance scheme
 - 2) Price Deficiency scheme
 - 3) Private Procurement and stockist scheme