

1. What do you understand by the terms 'forward' and 'backward' integration in food processing industries? Illustrate with the help of suitable examples.

Approach:

Question is asking you to illustrate such an answer will generally involve the use of many examples, such as tables, figures, graphs, or concrete research statistics and evidence.

Introduction:

Food processing is the transformation of raw ingredients into food, or of food into other forms (i.e. food processing may denote direct manufacturing of food or value addition on existing food). Food processing typically takes harvested crops or butchered animal products and uses these to produce long shelf-life food products. It also includes the process of value addition to produce products through methods such as preservation, addition of food additives, drying etc. with a view to preserve food substances in an effective manner, enhance their shelf life and quality.

Body:

Forward Linkage: Forward linkage integration refers to consolidating the chain from processing industries to market. It is when, the establishment of a processing industry can lead to the development and establishment of the number of advanced stage industries.

There are many examples such as:

- In context with Food Processing Industry, a Food Processing Unit needs to have strong backward linkages with the farmers, farmer producer organizations, self-help groups, farmer's groups etc.
- Further, to be able to sell its processed food, it needs to develop strong forward linkages with wholesalers, retailers, exporters etc.
- Forward Integration refers to that integration where Company expands its activities to downstream areas. Company aims to get more control over sales, consumer-contact and eliminate any middlemen, wholesaler, retailer. e.g. Amul has its own pizza outlets and ice cream parlours.
- products such as vegetable oils and rubber are used in a wide variety of manufacturing industries; based on the preparation of hides and skins, tanning operations can be started, as can the manufacture of footwear and other leather goods.

Backward Linkage: backward market integration refers to consolidating chains from farm to processing centres and to integration with ancillary industries. The feedback effects generated by a base industry on the development of the base sector is called backward linkage. The development of the food processing industry has many feedback effects on the agriculture sector itself.

There are many examples such as:

- Once a food processing industry is established, it results in increasing the demand of raw materials provided by the agriculture sector.
- The establishment of processing facilities is itself an essential first step towards stimulating both consumer demand for the processed product and an adequate supply of the raw material.
- Backward integration refers to that integration where company expands its activities to upstream areas. Company aims to get raw material at cheap rates, uniform quality, steady supply and eliminate any middlemen. E.g., Starbucks (chain of coffee bars) buys coffee plantations in central America.
- The provision of transport, power and other infra-structural facilities required for agro-industries also benefits agricultural production.
- The development of these and other industries provides a more favourable atmosphere for technical progress and the acceptance of new ideas in farming itself.

Conclusion:

For an industry, backward linkages are directed towards suppliers; while the forward linkages are directed towards consumers. Rising per-capita income, changing life style and food habits provide significant opportunities for the growth of Food processing industry. ordinances and the schemes like SAMPADA, etc. are likely to strengthen backward and forward linkages in turn help the Food processing industries to grow from present 2% of GDP to optimise high output of farming sector.

2. Do an evaluation of the potential of food processing industries in the economically underdeveloped regions of the country.

Approach:

Question is straight forward in its approach, students need to evaluate the potential of food processing industries in the economically underdeveloped regions of the country, also they are expected to mention the issues the industry is facing in such areas of the country and how those issues can be addressed.

Introduction:

India Food Processing Industry is estimated at \$135 billion industry which is growing at about 8% annually. This growth rate is significantly more than agricultural growth rate which remains around 4%. These signals indicate toward phenomenal shift toward food processing from traditional ways. GDP by processing constitute about 10% that of agriculture. But given potential of India, this is an underachievement. With India moving from a position of scarcity to surplus in terms of food production, the opportunities for increasing food processing levels are innumerable. India's food processing sector, in recent years, has been known for its high-growth and high-profits, thus, increasing its contribution to the world food trade every year.

Body:

Currently, Indias food processing industries are localized mostly in urban areas most of the processing takes place in limited crops only, the reasons for the same are as follows-

- Lack of efficient supply chain infrastructure and inadequate expansion of processing and storage capacity commensurate with agriculture production have been identified as the main reasons for higher wastages, higher cost of production, lower value addition in food processing sector.
- Processors face difficulty in availing benefits under schemes being implemented by different agencies of central and state governments in the absence of exclusive supportive forum at the state level. Lack of awareness and absence of appropriate knowledge sharing & guidance forum adds to their problem.
- Multiple clearances are required for setting up of food processing units. The small processors are also required to go through the same processes as is applicable to larger units. Availing permission for Change in Land Use (CLU), environmental clearance, water and power connections are not only time consuming but also costly.
- Food processing units are required to comply with labour laws in relation to lay-off, retrenchment and closure even though these units run seasonally. Further, payment of minimum charges for electricity even though units run for few months in a year, adversely affects the commercial viability of the processing units.

- India is processing less than 10% of its agricultural output, thus, presenting immense opportunities for increasing these processing levels and leading to investments in this sector. With agriculture and its allied sectors being the largest source of livelihoods in India, 70% of its rural households still depend primarily on agriculture for their livelihood. Thus, this sector provides a huge employment generation potential as well. The food processing sector has been acknowledged as a high priority industry by the government of India and is currently being promoted with various fiscal reliefs and incentives.

Potential of food processing in economically underdeveloped regions of the country-

- Agriculture and allied sectors and rural India have enormous employment opportunities and affect the country most, so the government reinforced stress on the supply chain and agriculture and rural sectors and related industry, including domestic trade and export, food processing, fisheries, animal husbandry, cold storage, etc.
- With an increase in urban working culture and fast-paced lifestyles, there is limited time available for cooking and meal preparation. Thus, processed foods such as ready-to-eat products and snacks have become quite popular, particularly in urban areas. By 2030, Indian annual household consumption is set to treble, making India an opportune market for consumption of processed foods.
- India boasts of the world's largest population of livestock and is currently the third largest egg producer in the world, as per FAO (Food and Agriculture Organisation) in 2016. Additionally, India is also the fifth largest producer in broiler production. However, India currently processes only 6 % of poultry and 21 % of meat.
- India has a rich and diverse fisheries resources such as deep seas, lakes, ponds and rivers. They account for more than 10 % of the global biodiversity in terms of fish and shellfish species. India's vast potential in the sector can be seen in its long coastline spanning 8,118 kilometers apart from the inland waterways.
- Within India, Uttar Pradesh is the largest dairy and milk-producing state because it is home to the highest buffalo population and the second-highest cattle population in the country. Most of the rural population in this state is engaged in livestock rearing and dairying. Gujarat has numerous cooperative dairy milk unions, private dairy plants, and primary milk cooperative societies, which play crucial roles in the production of milk in the state. Being one of the primary dairy consumables, the increase in demand for milk in the country can be linked to an increasing population. Investment in the infrastructure required to change this ecosystem to an organized and hygienic one would be tapping into unrealised potential for supply and distribution logistics as well as a huge customer base.
- Malnutrition and dietary risks associated with diseases remain prevalent globally, including in India. In addition to this, rapid urbanization, changing lifestyles and lack of awareness with respect to the required nutrition intake have led to a greater need for health supplements and nutraceuticals in the Indian market. Ensuring safe and nutritious food for over 1.3 Bn Indian citizens on pan-India basis calls for massive outreach efforts. India represents a vast

market for nutraceuticals as almost every segment has a need for some form of nutraceuticals.

Government initiatives in this direction-

- PRADHAN MANTRI KISAN SAMPADA YOJNA (PMKSY)- Mega Food Parks are based on 'cluster' approach and focus on creation of state-of-the-art support infrastructure in a well-defined agri/horticultural zone for setting up of modern food processing units in the industrial plots provided in the park with well-established supply chain.
- Scheme for Cold Chain and Value Addition Infrastructure-It covers creation of infrastructure facilities along the entire supply chain viz. pre-cooling, weighing, sorting, grading, waxing facilities at farm level, multi product/ multi temperature cold storage, CA storage, packing facility, IQF, blast freezing in the distribution hub and reefer vans, mobile cooling units for facilitating distribution of horticulture, organic produce, marine, dairy, meat and poultry.
- Scheme for creation of backward and forward linkages-Provide effective and seamless backward and forward integration for processed food industry by plugging the gaps in supply chain in terms of availability of raw material and linkages with the market, financial assistance provided for setting up of primary processing centers/ collection centers at farm gate and modern retail outlets at the front end along with connectivity through insulated/ refrigerated transport.
- PM Formalisation of Micro Food Processing Enterprises' (PM FME)- The Scheme adopts One District One Product (ODOP) approach to reap benefit of scale in terms of procurement of inputs, availing common services and marketing of products. The states would identify food product for a district keeping in view the existing clusters and availability of raw material. The ODOP product could be a perishable produce based product or cereal based products or a food product widely produced in a district and their allied sectors.

Conclusion:

Food processing seems to have promising future, provided adequate government support is there. Food is the biggest expense for an urban Indian household. About 38 % of the total consumption expenditure of households is generally spent on food. This share is declining consistently. As mentioned, food processing has numerous advantages which are specific to Indian context. It has capacity to lift millions out of undernutrition. Government has challenge to develop industry in a way which takes care of small scale industry along with attracting big ticket domestic and foreign investments.

3. What are the main constraints in the management of supply chain of food and agri products in India? What reforms would you suggest to address these challenges?

Approach

A straightforward question where in the candidate needs to address the question in two parts, with the first part addressing the main constraints in the management of supply chain of food and agri products in India while in the second part, the candidate needs to suggest some reforms that would address the challenges mentioned above.

Introduction

Food supply chain management refers to the process whereby the movement of agro based product(s) from the initial supplier to the ultimate user occurs with all non-value adding expenses. In this regard, the Indian agriculture supply chain is far more complex and difficult to manage, as compared to developed countries because of its unorganized nature and a large number of intermediaries.

Body

Agriculture is inherently a fragmented and unorganized sector involving a diverse range of distinct stakeholders such as inputs supplier, farmers, traders, commission agents, processors and distributors. Here, the main constraints in the management of supply chain of food and agri products in India include –

1. **Fragmented supply chain:** The long and fragmented supply chain results in the wastages and price escalations due to the large share of unorganised players in the supply chain and operating commercial viability challenges.
2. **Inadequate cold storage and warehousing facilities:** Warehousing is a key requirement in the overall supply chain it is mostly dominated by unorganized players. 20% of warehousing is organized currently with 70% of the organized market controlled by the Government.
3. **Logistical challenges related to quality and connectivity:** Indian national highways account for only 2% of the total road network but carry 40% of all cargo. Port capacity may be increasing but lack of connectivity to these ports leads to cost escalations and delays in the goods transferred.
4. **Lack of demand estimation:** Demand forecasting is totally absent and the farmers try to push whatever they produce into the market.
5. **Lack of system integration:** The supply chain needs to be designed and built as a whole in an integrated manner. The process of new product development, procurement and order to delivery processes should be well designed and well supported with the help of IT tools and software.
6. **Lack of technology applications:** Cold chain logistic supply chains should take advantage of technology improvements in data capture and processing, product tracking and tracing, synchronized freight transport transmit times for time compression along the supply chain and supply-demand matching.

7. **Presence of large number of unorganized retailers:** At present the unorganized retailers are linked with farmers through wholesalers or commission agents. The commission agent's and wholesaler's redundant supply chain practices make unorganized further inefficient.
8. **Lack of proper Sorting and grading technology:** Farmers lack the knowledge about the process as the entire ecosystem with regards to quality control is missing on a wider scale in India.

In order to shore up the emergence of professionally managed agri-supply management of different agricultural produce, the Government should play its facilitating role to its hilt while also considering the following reforms to address multiple challenges involved –

- Focus should be laid on free play of demand and supply forces in the market. This has to be enabled by removing different entry barriers, having a proper market information system, promoting grading and standardization, taking care of quality and safety issues, etc.
- Vertical coordination of farmers through cooperatives, contract farming and retail chains would facilitate better delivery of output, reduce market risks, provide better infrastructure and create awareness regarding the prevailing and new technologies.
- More focus on Mega food parks – where Mega Food Park consists of supply chain infrastructure including collection centres, primary processing centres, central processing centres, and food processing units.
- Customized logistics is another important immediate requirement to make logistic effective. This reduces the cost, facilitates the maintenance of quality of the produce and fulfils the requirements of targeted customers.
- Public private partnership is another strategic solution. Supply chain like washing, waxing, grading, sorting, packing, pre-cooling, handling facilities, insurance, finance, transport and processing facilities would add value to supply chain functioning.
- It is time a proper marketing system is in place for disseminating information on what to produce, when to sale and where to sell etc. and on packaging, transportation, grading, and standardization.
- Different legal restrictions inhibiting growth of competitive environment should be dismantled and replaced by a facilitating legal environment.

Conclusion

The supply chain management has to be improved in all the stages of the supply by adopting global best practices in storage, packaging, handling, transportation, value added service etc. And also by disintermediation and participation of organized players i.e., modern supply chain with a view to benefit both farmers as well as ultimate consumers.

4. How can digital technology help in undertaking second-generation land reforms? Discuss.**Approach**

Candidates are expected first to write about second generation land reform and then address the main demand of question how use of digital technology will help in undertaking second generation land reforms.

Introduction

Second generation land reforms are aimed at reorganising state and collective farms into family-size units and introducing market-oriented land systems. It is broadly about leaving resource allocation and production decisions to market forces rather than to the government institutions.

Body

Issues in undertaking land reforms for economic development:

- Benami Transfers: Excess lands were transferred to ghost beneficiaries.
- Unproductive lands: The excess lands transferred were fallow or infertile lands which was of less use for cultivators.
- Fragmentation: It led to fragmentation of land holdings, there by increasing small and marginal farmers.
- Mechanization: With small and marginal land holdings, investment on machine and return on their investment was poor.

Digital technology a useful tool in undertaking second generation land reforms:

- For a majority of Indian households' wealth invested in real estate, accessing land records and other details of encumbrances including mortgage, liability or claim against a property, is often difficult. Investors too face the drudgery of visiting public land record departments and Registrar's office to verify land records and register land agreements.
- A centralized land records system and reforms in land laws are thus the need of the hour to ward off internal constraints, local agitations, and speculative increase in land prices. The GIS land bank system launched by the government recently is a potent step towards actualizing this clamour for change by addressing issues like transparency and credibility directly.
- The GIS land bank system will serve as an information window for investors providing access to an array of details on various industrial belts, eliminating the need to visit various offices and platforms for land information and obtain clearances.
- The land bank system will also push the approach of "One District One Product", in line with the AtmaNirbhar Bharat vision, boost employment opportunities and attract investments from abroad by showcasing the improving ease-of-doing-business.

- With the arrival of GIS-enabled one-stop digital land bank platform, land records would be just a click away and can be accessed from anywhere around the world, enabling seamless and credible property registrations online, doing away with the need of any authorised intermediary.
- The Blockchain in the land registry is used for secure transfer of land property. The transparent nature of Blockchain enables to track the changes made in land documents. Advent of Blockchain technology in the land registry is playing a very beneficial role in this developing era. It is helping in uplifting the poor, and marginalized section of the society in fighting illegal authorization of land.
- The digitization of land records will mark an epoch in the history of real estate and amplify the potential of the country's real estate. The property sector which had for long been plagued by land issues that snowballed into complex litigations and disputes, will breathe a sigh of relief at this renaissance.
- With 24/7 availability of data online, it will become easily for buyers and sellers to scrutinize property data online and check the authenticity of a land or property.
- Digital enabled land records system, a full spectrum rollout in the near future will help organizations and decision makers to gain a deeper understanding of property economics, make faster decisions and take advantages of property developments in future essentially, what we often call a 'game changer'.

Conclusion

With the digitization of land records, a clear picture of land data, starting from the first owner of the land to its present status, including image of property and landowner will be available. This will eradicate confusion between government land and private land, usher transparency, and speed up land acquisition; the use of reliable digital land records will add considerable impetus for India's rapid economic growth through better functioning of land markets and boost investment too.

5. How do fragmented and small land holdings affect agricultural productivity? How severe is this problem in India. Discuss.

Approach- Candidate can outline the problems faced by agriculture sector because of the small land holdings. With the help of some data and facts, can suggest a way forward in the conclusion.

Introduction

From farm subsidies to farm loan waivers, the Indian government spends crores on farmer welfare, but these efforts will be inadequate unless they can tackle an increasingly daunting barrier: lack of land. The provisional figures from the latest agriculture census reveals how land—the most critical input for agriculture is getting more fragmented.

Body

How serious is the problem?

- Since the first agriculture census over 45 years ago, the number of farms in India has more than doubled from 71 million in 1970-71 to 145 million in 2015-16, while the average farm size more than halved from 2.28 hectares (ha) to 1.08ha
- The more numerous farms have been driven by rural population growth. Between 1970-71 and 2010-11, the number of farms increased by 194%, almost exactly in line with rural population, which increased by 189%. As Ramesh Chand and others pointed out in a 2011 Economic and Political Weekly research paper, this relationship is a reflection of India's inheritance pattern, which leads to farms divided between multiple heirs.
- The majority of India's farms (86%) are less than 2ha. The bulk of which are located in the poorer states such as Uttar Pradesh and Bihar.

- The Indian experience shows that small farmers are more productive than large farmers. Ramesh Chand and others show that small farmers use more inputs (such as fertilizers), use their land more intensely (planting more crops) and adopt more technology. Yet, despite this efficiency, farm incomes remain poor. It is the poor returns to farming—despite intensive efforts put in by farmers—that lie at the root of India’s farm crisis, and the recent farm angst.
- Given household sizes in rural India, small farms struggle to generate enough income for everyone in a household and often lack alternative sources of income.
- National Sample Survey Office’s (NSSO) 2003 and 2013 surveys of farmers to show how farm size is an important determinant of income and, consequently, income inequality. They find that in 2013, for marginal farmers (less than a hectare of land), household consumption exceeded net monthly income of less than ₹ 5,500 from both farming and non-farming activities.

Way ahead

- One obvious solution to small farm sizes will be consolidating land into larger farms by enabling land leasing. However, this can be a complex and costly process, made more difficult by the lack of accurate land records.
- PRS survey pointed out that, despite most states computerizing and digitizing land records, as of 2017, spatial data had only been verified in 39% of villages. This is particularly problematic for small farmers who, without accurate land records, cannot access credit or secure insurance.
- India’s farmers are not alone in these struggles. A 2016 study estimated that around 84% of the world’s farms are less than 2ha. While many of these small farms face the same challenges, some small farmers, such as those in China, have been more successful in securing sustainable livelihoods.
- Economists agree that improving land records, investing in research and development, providing local rural non-farm employment opportunities and building better rural infrastructure are policies that can help small farmers.

Conclusion

More resources should be allocated to agriculture to increase irrigated area, improve soil health, promote agri-processing, and cover production risk, among many others. Despite various schemes already existing in the agriculture sector, it continues to remain a laggard, in order to ensure flourishing and vibrant agriculture improvement of land record and experiment of land consolidation on the basis of China's experience can be become effective alternative.

