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Secondary Agriculture

and Value Addition for Profitable Agriculture

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Introduction

Agriculture plays a vital role in India's economy. According to the 2011 census, 263 million people (54.6%) are engaged in the agriculture sector (Census Data, 2011). As per the 2nd estimates by the Central Statistics Office (CSO), the share of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) is estimated to be 17.3 per cent of the Gross Value Added (GVA) during 2016-17 at 2011-12 prices (Janardhan, 2017). Indian agriculture has already reached a stage of self-sufficiency in food production. Total food grain production is estimated at an all-time high of 273.83 million tonnes in 2016-17, 8% higher than the 251.6 million tonnes last year, and surpassing the previous record of 265 million tonnes in 2013-14 (IBEF, 2017). Production of horticulture crops touched a record 295 million tonnes in 2016-17, 3.1% higher than the previous year's output

(MoA&FW, 2017). The milk production has increased significantly from 137.7 million tonnes in 2013-14 to 164 million tonnes in 2016-17 (DAH&D, 2017). Both egg and fish production has also registered an increasing trend over the years. Egg production was around 78.48 billion eggs in 2014-15, while poultry meat production was estimated at 3.04 MT. The total fish production during 2014-15 was 10.16 MT (DAH&D, 2017).

But the increased production is not leading to increased income of the farmers in our nation due to the many fold challenges like declining land holding, increasing number of small and marginal farmers, depleting natural resources, climate change, scarcity of skilled agricultural labour, rising costs of inputs, uncertain market prices and declining youth interest in farming. Farmers have begun to perceive farming as a non-lucrative profession due to low profit generation. Thus, we need to find ways and alternatives to divert our attention towards after harvest and post production strategies along with the provision of basic amenities to increase the farmer income. In order to improve the economic condition of the farmers, Indian government has set up an ambitious target in front of the nation i.e. to double the income of the farmers by 2022 through a seven-point strategy:

1. Improving productivity
2. Betterment in agri-input provision
3. Improvement in water use efficiency and irrigation facilities among the farmers
4. Diversification and commercialization of agriculture
5. Reduction of post-harvest losses and promotion of value addition
6. Better market price realization
7. Mitigating the biotic and abiotic risks in crop production

Out of all the above listed options, promotion of secondary agriculture and value addition is a sunrise sector considering its immense potential to double farmers' income. India is the second largest producer of fruits and vegetables in the world. The production of vegetables and fruits for 2016-17 was 300.6 million tonnes, denoting a year-on-year rise of over 5%. But nearly 35-40 % of this produce is wasted every year leading to huge monetary loss worth Rs 75000- 1,00,000 crore per annum. India is one of the leading producers of agricultural and livestock commodities, however India's share in world trade of processed food is a meager 1.6% and value addition is 20%. Agricultural crops are predominantly perishable in nature and leads to huge wastage if left unattended after harvest. It needs to be cleaned, sorted, stored, processed, packed and transported to minimize post-harvest losses. Ninety five percent of the investment is for production whereas income enhancement is only possible through post production. Thus, attention should be diverted from production and focused on activities beyond production, so as to enhance the income of farmers.

Secondary agriculture includes "all practices and processes like cleaning, grading, drying, storage, milling, processing, packaging, etc which add value to primary agricultural commodities by using efficient technologies, market information and consumer preference". The term value addition in agriculture refers to the process of increasing the economic value and consumer appeal of an agricultural commodity and reaching the end users in a desired form, packaging, quantity, quality and price. Agro processing could be defined as set of techno-economic activities carried out for conservation and handling of agricultural produce or raw materials and to make it usable as food, feed, fibre, fuel or industrial raw material.

Challenges

The food processing sector in India is faced with multiple challenges, as follows:

- Socio Economic Environment
- Demand for Processed Foods among poorer sections
- Unorganized Processing industry
- Poor Linkages between Public & Private sector
- Policy Issues in Food Processing (APMC ACT, Commodities Act, Taxes, Credit)
- Traditional and Subsistence Farming, Weak Market Linkages & Infrastructure.
- Small farms which constrain productivity levels or yield per hectare.

Inadequate attention to the agro-processing sector has put both the producer and the consumer at a disadvantage and it hurts the economy of the country. Some estimates suggest that in developed countries, up to 14 per cent of the total work force is engaged in agro-

processing sector directly or indirectly. However, in India, only about 3 per cent of the work force finds employment in this sector revealing its underdeveloped state and vast untapped potential for employment.

The extent of processing of agricultural products (EPA) of various sectors are 1.05% for fruits, 1.23% for vegetables, 5.4% for milled pulses, 17.7% for milled coarse cereals, 8.5% for spices, 8.3% for meat, 1.6% for milled rice, 2.05% for milled wheat and 14.1% for fish. The EPA is high for Soyabean (30%), Coarse Cereals (12%), Fish (11%) and Fresh Milk (11%). The average extent of food processing is 5.42%.

The industry has been facing problems of low capacity utilization, technological obsolescence and marketing. It has to work under the constraints of high fluctuations in raw material quality and fluctuating market price, poor technology for handling and storage, inadequate R&D support for product development, high cost of energy and uncertainty in availability of adequate quantity for processing purposes, inadequate and expensive cold chain facilities and varying requirement of processing conditions from one material to another.

Improved post-harvest processing and value addition to raw farm produces will not only reduce loss but also increase marketability in city areas. Clean food with desired size and shape, ready to use food, preserved food with additional features in taste and ease in use is always considered superior to raw farm produce. Farmers and entrepreneurs can collectively set up their own low cost community based and commodity specific storage and processing units which will help in preserving/processing the excess horticultural produce during glut season, thus preventing the post- harvest losses and fetching higher and remunerative prices of the produce. It also creates opportunities for employment of rural youth, income generation and ensures household food and nutritional security for all at an affordable cost.

Recent products, processes, trends and technologies in various agricultural produce

Sl. No.	Crop	Products, Processes, Trends and Technologies
1.	Rice	Breakfast cereals, partially cooked/ quick cooking rice Improved process of parboiling, Puffed and flaked rice, Rice bran oil, Snacks, bakery items
2.	Wheat	Bread, biscuits, suji and atta, Wheat flakes and puffed wheat, whole bran wheat bread, fortified wheat flour
3.	Maize	Corn flour, corn flakes, ready to eat salted & sweetened snacks, corn oil, corn syrup, cattle feed
4.	Pulses	Snacks, Automatic processing with driers, color sorters and packaging
5.	Coarse Cereals	Extruded snacks developed from ragi, corn products, ready to-eat breakfast foods, sorghum-soybean fortified foods, industrial raw materials
6.	Soybean	full fat soy flour, soy drink/ soy milk, soy paneer (TOFU) and soy fortified baked products, ready to eat snacks
7.	Milk	Milk products such as shrikhand, butter milk, paneer, ghee and sweets.
8.	Fruits and vegetables	jams, jellies, dried vegetables, pickles, canned products, pulp, juice, ready to serve beverages, syrups, squashes, tomato products
9.	Commercial crops	dehydrated pepper, freeze dried green pepper, ginger candy, ginger beer/in-brine/ squash, ginger flakes
10.	Plantation crops	coconut milk and milk powder, coconut cream, shell powder, shell charcoal

R&D in agro-processing sector

A number of institutions are engaged in agro processing research. ICAR has many Institutes with some component of Post-Harvest Technology (PHT). CSIR, State Agricultural Universities, IITs are involved in the R & D activities. Some of the leading government funded R&D Institutes are: CFTRI, Mysore; CIPHET, Ludhiana; IARI, New Delhi; NDRI, Karnal; DFRL, Mysore; CIAE, Bhopal; IIT, Kharagpur; GPBUA&T, Pantnagar; IGMRI, Hapur; TNAU, Coimbatore; PAU, Ludhiana; GAU, Anand; RAU, Udaipur; BCKV, Kalyani; OTRI, Anantpur; PPRC, Thanjavur; MERADO, Ludhiana; MPKV, Rahuri; ILRI, Ranchi; IVRI,

Izatnagar; NIRJAFT, Kolkata; CIRCOT, Mumbai; IISR, Lucknow; IGFRI, Jhansi; KVIC Mumbai; HBTI, Kanpur and PHT Institute, Pune. In the field of PHT, there are 4 All India Coordinated Research Projects (AICRPs): (1) All India Coordinated Research Project on Post Harvest Technology (21 centers in the country, coordinated from CIPHET, Ludhiana), (2) Processing, Handling, and Storage of Jaggery and Khandsari (5 centers, coordinated from IISR, Lucknow), (3) Application of Plastics in Agriculture, Plant Environment Control & Agricultural Processing (5 centers, coordinated from CIPHET, Ludhiana) and (4) Post Harvest Technology of Horticultural Crops (8 centers, coordinated from IARI, New Delhi). A number of universities have programmes in the area of agro-processing. Some of the state governments also have been supporting R&D activities on agro processing through a number of their departments.

Successful cases

There are various cases of successful agripreneurs who have gained profitably from secondary agriculture and value addition. A farmer of Gujarat engaged in banana cultivation, produces 600-700 kg banana/ha worth Rs 12-15 lakhs and exports to Arab countries in collaboration with NDDB and Mother Dairy. As a side business, he processes the loose and left-over bananas into wafers and earns Rs 9000 per hectare. He also extracts fibre from the pseudostem which is used for manufacture of quality paper, cloth and other value-added items and generates an income of Rs 42000 per hectare. A woman farmer from Haryana is running her food processing factory where she produces 135 different types of pickles, *chutneys*, *murabbas*, candies, jam, jelly, aloe-vera gel, *Pusa* fruit drinks of *jamun*, litchi, mango, strawberry etc under FPO guidelines and generating an annual turnover of more than Rs. 2 crores and providing employment to 200 women on permanent and seasonal basis.

The food processing sector in India is still in a nascent stage with only 8 per cent of the produce being processed as against 80-98 per cent in case of high-income countries. The secondary agricultural sector is regarded as a potential sector for the Indian economy, owing to its immense untapped potential. The impetus for development of secondary agriculture has gradually increased due to consumers' demand for value added goods like ready-to-eat, ready-to-serve, convenience foods, functional foods and nutraceuticals in both domestic and international markets. This is again favoured by the growth of organised retail which makes the processed food easily available to the consumers. There are various Government schemes to support secondary agriculture and value addition. The present paper discusses the potential and prospects of secondary agriculture to substantially enhance the income of farmers and also provide self-employment opportunities to rural masses.

Schemes for Promotion of Food Processing Industries

Government is running various schemes for promotion and development of Food Processing Industries (FPIs) in the country. The details of various Schemes of Ministry of Food Processing Industries are as under:

Central Sector Schemes

(a) Scheme for Development of Infrastructure for Food Processing

i. **Mega Food Parks**:- The Scheme of Mega Food Parks was launched during 2008 to provide modern Infrastructure for food processing Units in the country on pre-identified cluster basis. The pattern of assistance is 50% of the eligible project cost in general areas and 75% in difficult areas subject to a maximum of Rs.50.00 crore.

ii. **Integrated Cold Chain, Value Addition and Preservation Infrastructure**:- The Scheme of Integrated Cold Chain, Value Addition and Preservation Infrastructure is to provide integrated cold chain and preservation infrastructure facilities without any break, from the farm gate to the consumer. The scheme envisages grant-in-aid @ 50% of the total cost of plant and machinery and technical civil work in general areas and 75% in North- Eastern region and difficult areas subject to maximum of Rs.10.00 crore per Project. It covers creation of infrastructure facility 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 etc.

iii. **Modernization of Abattoirs**: - The Scheme of Modernization of Abattoirs was launched during 2008. The Scheme is implemented through local bodies (Municipal Corporations and Panchayats)/Public Sector Undertakings/Cooperatives/ Boards under Government and will have the flexibility for involvement of private investors on PPP basis. The Scheme envisages grant-in-aid @ 50% of the project cost in general areas and 75% for North- Eastern region subject to a maximum of Rs.15.00 crore per project.

(b) Scheme of Technology Up-gradation/Establishment/ Modernization of Food Processing Industries

The Scheme is meant to assist prospective entrepreneurs to set up food processing units to reduce the wastage of agricultural and horticultural produce. Under the scheme, a maximum of Rs.50.00 lakh is provided as grant -in-aid to general areas and Rs.75.00 lakh in difficult and North- Eastern areas, for eligible entrepreneurs. This scheme has been subsumed in Centrally Sponsored Scheme - National Mission on Food Processing (NMFP) w.e.f. 01.04.2012.

(c) Scheme for Quality Assurance, Codex Standards, Research & Development and Other Promotional Activities

i. **Food Testing Laboratories: -** The objective of the scheme is to ensure safety and quality of food products with the analysis of the samples received from food processing industries and other stakeholders. The establishment of a surveillance system for monitoring the quality and composition of food and thereby ensuring compliance of international standards on food.

ii. **Implementation of HACCP:-** The objective of the scheme is to motivate the food processing industries for adoption of food safety and quality assurance mechanisms such as TQM including ISO 14000, ISO 22000 HACCP, GMP, GHP, to prepare them to face global competition in post STO Regime, to enable adherence to stringent quality and hygiene norms, to enhance product acceptance by overseas buyers and to keep Indian industry technologically abreast of international best practices.

iii. **Research & Development: -** The objective of this scheme is that the end product/findings of R&D work must benefit food processing industries in terms of product and process development, improved packaging, value addition and leading to innovative products and process with commercial value.

iv. **Promotional Activities: -** Under the Scheme for Promotional Activities, the Ministry provides financial assistance for organizing pan India level Seminars/Workshops/Fair/ Exhibitions and also participate in pan India level Fair/Exhibitions spearheaded by Apex Industry Associations and Autonomous Bodies/PSUs of Govt. of India with the objective of dissemination of information regarding food processing industries.

(d)Scheme for Human Resource Development

Ministry of Food Processing Industries (MFPI) has been implementing the Scheme for Human Resource Development since 9th Plan and onwards to augment the supply of trained manpower/ personnel at all levels for food processing sector namely entrepreneurs, managers, sales persons, floor workers etc.

During the 12th Five Year Plan (2012-13), the HRD Scheme has been subsumed under the National Mission on Food Processing (NMFP), which is being implemented through State/UT Governments.

(e) Strengthening of Institutions

This scheme focuses on putting in place new and strengthening of existing institutional mechanisms for human resource development in the food processing sector. The following Institutions have been set up by the Ministry for development of food processing sector:-

- National Institute of Food Technology Entrepreneurship & Management (NIFTEM)
- Indian Institute of Crop Processing Technology (IICPT)
- Indian Grape Processing Board (IGPB)
- National Meat and Poultry Processing Board (NMPPB)

(f) Centrally Sponsored Scheme of National Mission on Food Processing (NMFP):

Under the Mission, funds are shared on 75:25 basis by Govt. of India and States; 90:10 in North- Eastern States and 100% grants for

UTs. The components of the NMFP are (i) Technology Up-gradation / Setting up / Modernization of Food Processing Units (ii) Cold Chain, Value Addition and Preservation Infrastructure for Non-Horticulture Products (iii) Modernisation of Abattoirs (iv) Human Resource Development (v) Promotional Activities (vi) Creating Primary Processing Centres / Collection Centres in Rural Areas (vii) Modernisation of Meat Shops and (vi) Reefer Vehicles.

(g) SAMPADA (Scheme For Agro-Marine Processing And Development Of Agro-Processing Clusters)

GOI launched the new scheme SAMPADA which will bring value addition of agriculture produce. SAMPADA with an allocation of Rs. 6,000 crore is expected to leverage investment of Rs. 31,400 crore, handling of 334 lakh MT agro-produce valuing Rs. 1,04,125 crore, benefit 20 lakh farmers and generate 5,30,500 direct/ indirect employment in the country by the year 2019-20. The objective of SAMPADA is to supplement agriculture, modernize processing and decrease agri-waste.

SAMPADA is an umbrella scheme incorporating ongoing schemes of the Ministry like Mega Food Parks, Integrated Cold Chain and Value Addition Infrastructure, Food Safety and Quality Assurance Infrastructure, etc. and also new schemes like Infrastructure for Agro-processing Clusters, Creation of Backward and Forward Linkages, Creation / Expansion of Food Processing & Preservation Capacities.

Government has taken various other measures to boost food processing sector as follows:

a) To provide impetus to investment in food processing and retail sector, govt. has allowed 100% FDI in trading including through e-commerce, in respect of food products manufactured and / or produced in India. This will benefit farmers immensely and will create back – end infrastructure and significant employment opportunities.
b) The govt. has also set up a Special Fund of Rs. 2000 crore in NABARD to make available affordable credit at concessional rate of interest to designated food parks and agro processing units in the designated food parks.
c) Food and agro–based processing units and cold chain infrastructure have been brought under the ambit of Priority Sector Lending (PSL) to provide additional credit for food processing activities and infrastructure thereby, boosting food processing, reducing wastage, create employment and increasing farmers' income.

Quality Control & Standards

Food processing industries cover a large spectrum of products of plant and animal origin. Quality has got to be maintained for domestic as well as export markets. In this respect, a number of organizations have come up for the formulation of standards and for monitoring their quality.

Bureau of Indian Standards (BIS)

The activities of BIS in the field of agro-processing are two-fold: a) formulation of Indian standards and b) their implementation through its voluntary and third party certification system. BIS has Indian Standards related to food-grains and their products, bakery and confectionery items, sugar, edible starches and their products, processed fruit and vegetable products, protein rich foods, stimulant foods like tea, coffee and cocoa, alcoholic beverages, spices and condiments and food products of animal origin like milk and meat, fish, poultry etc. These standards, in general, cover raw materials permitted and their quality parameters, hygienic conditions under which the product is manufactured and packaging and labeling requirements. The standards also prescribe freedom from toxic substances and contaminants. Informative labeling is also a very important area and the level should contain sufficient information to enable the consumers to know about positive nutritional characteristics such as protein, fat, dietary fibre etc., negative characteristics such as pesticides, residues, toxins etc. as also information regarding ingredients used, food activities, net contents etc. In this area, the Bureau has brought out a Code of Practice for labeling of Pre-packed foods covering general guidelines for labeling and guidelines on claims and nutritional labelling.

GATT and Sanitary/Phytosanitary Measures

Agreement on the application of Sanitary and Phytosanitary Measures (The SPS Agreement concluded under GATT in 1994) came into

effect in 1995 for developing international standards to ensure the safety of food for consumers and to prevent the spread of pests or diseases in animals and plants. These measures protect human/animal life from risks arising from additive contaminants, toxins or diseases – causing organisms in their food. The objectives of SPS can be accomplished in several ways as indicated below.

- Requiring product to come from a disease-free area
- Inspection of products
- Specific treatment of processing of products
- Setting allowable maximum levels of pesticide residues or permitting the uses of only certain additives in food.

SWOT analysis of agro-processing industry infrastructure in India

Strengths

- Round the year availability of raw materials.
- Social acceptability of agro-processing as important area and support from the central government.
- Vast network of manufacturing facilities all over the country.
- Vast domestic market.

Weaknesses

- High requirement of working capital
- Low availability of reliable and accurate instruments and equipments
- Inadequate automation w.r.t. information management.
- Inadequately developed linkages between R&D labs and industry.

Opportunities

- Large crop and material base in the country due to agro-ecological variability offers vast potential for agro processing activities.
- Integration of developments in contemporary technologies such as electronics, material science, computer, bio-technology etc. offer vast scope for rapid improvement and progress.
- Opening of global markets may lead to export of our developed technologies and facilitate generation of additional income and employment opportunities.

Threats

1. Competition from global players
2. Loss of trained manpower to other industries and other professions
3. Rapid developments in contemporary and requirements of the industry may lead to fast obsolescence.

Plan and Strategy

The objectives of agro-processing projects in India should be to:

- minimize product losses,
- add maximum value,
- achieve high quality standards,
- keep processing cost low,
- ensure that a fair share of added value goes to the producer

Conclusion

Agro-processing is now regarded as the sunrise sector of the Indian economy in view of its large potential for growth and likely socio economic impact specifically on employment and income generation. Properly developed, agro-processing sector can make India a major player at the global level for marketing and supply of processed food, feed and a wide range of other plant and animal products. The extent of post-harvest losses can be brought down to less than 50 per cent of the existing level on proper transfer and adoption of agro processing technology. Hence, it would be in the long term interest of the economy to invest in developing suitable infrastructure such as proper grain storage structures, cold stores and processing systems to avoid the losses. R&D has to focus on the issues of economically producing value-added products and product diversification.