

Review Article

Value Addition in Cereals

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ABSTRACT

Keywords

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Value addition is one of important components of nutritional security. Sometimes surplus production is the cause of lower price of produce in market. Value addition can lead to better use of crop residues, processing by-products and wastes in eco-friendly and economically rewarding mode. Value addition can play a major role and issue of IPR will have a critical contribution to it.

Introduction

India has only 2.4% of total land area on the planet earth, to support survival of about 1.30 billion population, which is nearly 1/5th of total world population. Indian agriculture has shown tremendous evolution after independence and converted India as Exporting country from importer of food grains.

In 2013-14 share of Agriculture in total GDP was 18.0 per cent. As per WTO's trade statistics the share of India's agriculture export and import in world trade in 2013-14

was 2.7 per cent and 1.3 per cent respectively.

Agricultural exports as a per cent of Agricultural GDP have increased from 9.1 per cent in 2008-09 to 14.1 per cent in 2013-14. Agricultural imports as a percentage of Agricultural GDP has also increased from 4.0 per cent to 5.5 per cent during the same period.

India ranks third in total Cereals production after China and USA (Agril Stat. at a Glance

2015). Post-Harvest Losses in cereals are estimated to be in the range of 4.45 % (Maize) to 5.99 (Sorghum). Ever-increasing population however poses serious challenges to prolong this scenario and ways have to be thought of to provide safe and quality food to masses. To achieve this goal, diversification and modernization of agriculture for higher productivity and equitable distribution of food commodities and other necessities of life are needed.

In developing countries, it could be achieved to a great extent through selective mechanization of agriculture and appropriate post-harvest management and value addition in the production catchments, leading to employment generation in the rural sector and minimization of losses of the harvested biomass.

Value-added agriculture refers most generally to manufacturing process that increases the value of primary agricultural commodities.

In India, agro-processing is regarded as the 'sunrise sector' of the economy in view of its large potential for growth and socio-economic impacts on employment, income generation and exports (Grover *et al.*, 1996).

Value-added agriculture may also refer to increasing the economic value of a commodity through particular production process, e.g., organic produce, or through regionally branded products that increase consumer appeal and willingness to pay a premium over similar but differentiated products. (Jana, 2015).

Agriculture forms the backbone of Indian economy and even though there has been large industrialization in last 60 years, agriculture still occupies a place of importance. Agriculture has abled to provide

us more or less food security, but, still failed in providing nutritional security.

One way to solve the problem is crop diversification which is responsible for a viable market system, creates opportunity to earn more as well as strong step toward nutritional security. Other step is value addition of agricultural produce. Crop diversification and value-addition are the two important pillars of nutritional security as well as two important techniques of profit maximization. The most important problem facing the country today perhaps is providing remunerative price to the farmers for their produce without incurring additional burden of subsidy through minimum support price or some such measures. This problem could be solved largely in the surplus production of cereals, vegetables, fruits, milk, fish, meat, poultry, etc., which are processed and marketed aggressively both inside and outside the country. Value addition coupled with marketing has thus the potentials of solving the basic problems of agricultural surplus or wastage and providing rural jobs, ensuring better prices to the growers, etc.

What is value addition?

Value addition is a process in which for the same volume of a primary product, a high price is realized by means of processing, packing, upgrading the quality or other such methods.

What is value added agriculture?

Value-added agriculture refers most generally to manufacturing process that increases the value of primary agricultural commodities. Value-added agriculture may also refer to increasing the economic value of a commodity through particular production process, e.g. Organic produce, or

through regionally branded products that increase consumer appeal and willingness to pay a premium over similar but differentiated products. Value-added agriculture is regarded by some, a significant rural development strategy. Small scale processing unit, organic food processing, non-traditional crop production, agri-tourism and bio-fuels development are examples of various value-added projects that have created new jobs in some rural areas.

Need for value addition

To improve the profitability of farmers

To empower the farmers and other weaker sections of society especially women through gainful employment opportunities and revitalize rural communities.

To provide better quality, safe and branded foods to the consumers.

To emphasize primary and secondary processing.

To reduce post-harvest losses.

Reduction of import and meeting export demands.

Way of increased foreign exchange.

Encourage growth of subsidiary industries.

Reduce the economic risk of marketing.

Increase opportunities for smaller farms and companies through the development of markets.

Diversify the economic base of rural communities.

Overall, increase farmers' financial stability.

Production Scenario of Major Agricultural Crops 2014-15

Due to the deficient rainfall as well as unseasonal rains and hailstorms, agricultural production in 2014-15 is estimated to be lower than that in 2013-14, a year of record production. As per 4th Advance Estimates for 2014-15, total production of rice in the country is estimated at 104.80 million tonnes which is lower by 1.85 million tonnes than the production of rice during 2013-14. Production of wheat estimated at 88.94 million tonnes is also lower than its record production of 95.85 million tonnes during 2013-14. The production of Coarse Cereals is estimated at 41.75 million tonnes which is lower than the production of Coarse Cereals during 2013-14. Table below gives Area, Production and Yield of major crops.

Total food grains production during 2014-15 is estimated at 252.68 million tonnes is lower by 12.36 million tonnes than the record production of 265.04 million tonnes of food grains achieved during 2013-14. Total production of pulses and oilseeds estimated at 17.20 million tonnes and 26.68 million tonnes respectively are also lower by 2.05 million

Tonnes and 6.07 million tonnes than their production levels during 2013-14.

The data pertaining to India's export of various processed and value added products is given in Table 2. These products include Cereal Preparations (Biscuits, corn flakes, Bread, Pasta and other bakery products.), Milled Products (Wheat flour, Maize flour, Rice flour and other cereals flour), Rice preparations (Rice in husk, Brown rice, Parboiled rice) and Pulses Product i.e dried, split, shelled & skinned pulses. Though the export is fluctuating in quantity terms we

can find significant growth in value terms over the period 2013 to 2016.

Classification of food items according to level of processing

What encourages value addition through food processing?

India is one of the World's major food producers.

Turnover of the total Indian food market contributing 1.5 per cent to the global processed food trade.

Employment Generation Potential – 54,000 person/Rs.100 million investment.

Primary Processing -75 per cent and Secondary and Tertiary -25 per cent.

Agro-Food Processing industries can reduce losses to the tune of Rs.8000 crores by increasing value addition from current level of to 35 per cent.

Present rate of 2 per cent of commercial processing can be increased to 10 per cent by 2020 by investing Rs.15, 000crore.

Which can creates additional employment directly for 77 lakh people and indirectly for 3 crores people.

The Table 3 presents the comparative picture of the progress of processed food consumption between the two surveys. A decrease of the importance of “primary products” and of “first (low) processed products” in the food basket and a rise in the “first (high)” and “second processed products” is observed. The “second

processed products” consist of less than 10 per cent of the average urban food basket. Taking into account the level of expenditures and the availability of processed food, the rural households are not expected to have the same expenditure pattern. As can be seen, the consumption of “primary products” occupies a relatively minor place compared to that for urban households. For the “first (low) processing”, we observe that the rural households are dedicating more income but the relative decrease between the two surveys is more important for rural than for urban households. The relative share of “first (high) processed” food is lower in the rural area and even more, this affirmation has to be weighted by the fact that the fluid milk is classified as for urban households as a “first (high) processed product”.

Value created in the supply chain of rice

Nagaraj B.V. and Y. T. Krishnegowda (2015) attempted to find out the practices, end products and estimates of value creation, value realization and value loss to the stakeholders across its extended value chain of paddy in the state of Karnataka.

Average outgoing quality and price of paddy Rs. 1606 / quintal is considered (collective for all varieties of paddy cultivated in the state as obtained by weighted average of daily prices of paddy traded through all APMC markets in Karnataka for the year 2012-13)

The above analysis can be graphically visualized as follows in terms of change of unit value of the product at each stage of the supply chain.

Table.1 Production scenario of major agricultural crops 2014-15

Crop	Production (Million Tonnes)				
	2010-11	2011-12	2012-13	2013-14	2014-15 (3rdAE)
Rice	95.98	105.30	105.24	106.65	102.54
Wheat	86.87	94.88	93.51	95.85	90.78
Coarse cereals	43.40	42.01	40.04	43.29	40.42
Pulses	18.24	17.09	18.34	19.25	17.38
Total food grains	244.49	259.28	257.13	265.04	251.12

Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India 2015.

Table.2 India's Export of processed / value added products

Sr. No	Product	2013-14		2014-15		2015-16	
		Qty.	Value	Qty.	Value	Qty.	Value
1	Cereal Preparations	32146	286	30632	304	31464	334
2	Milled Products	418398	1006	415984	1019	416079	1078
3	Rice Preparations	2623	11	2456	14	3485.06	18
4	Pulses Product	345052	1746	220915	1210	251644	1603
5	<i>Papad</i>	19772	251	18081	277	18826	337

Table.3 Food expenditure pattern according to the level of processing

(In per cent)				
Level of processing	Urban		Rural	
	1999-2000	2004-05	1999-2000	2004-05
Primary products	17.4	16.8	14.6	15.3
First processing (Low)	37.9	34.8	49.9	43.9
First processing (High)	35.5	38.2	31.5	35.1
Second Processing	9.2	10.2	4.0	5.7

(Morisset and Kumar, 2008)

Table.4 Estimation of value created in the supply chain

Produce	Beneficiary	Time Days	Price/ Qtl	Activities /Cost of Value Addition	Average Earnings /Month (Rs.)
Paddy at Farm	Farmer	300	1606	Good Practices of Agriculture	2553
Paddy	Agent	150	1686	Networking with farmers & stockists	13255
Paddy to Rice	Paddy Stockiest	300	1790	Rice mill setting up. maintenance; Milling & Storing Cost	
Rice +Cut Rice Bran	Stockiest	300	3450	Heavy investment to purchase and store paddy & rice; Packaging bags of 25kg. 50kg	NA
Rice+Cut rice+Bran- Husk	Mill Owners [Stockiest)	300	3450	Heavy initial investment; Packaging as bags of 25 kg.50k" g	116053 (110197)*
Rice	Agent	150	3500	Networking with wholesale merchants	5551
Rice	Wholesaler	300	3700	Heavy Investment to purchase and store rice: Networking with mill owners and agents	13502
Rice	Unorganized Retail (95%)	NA	4200	Networking with Wholesalers	NA
Rice	Organized Retail (5%)	NA	4600	Customized packing. Branding	NA

Table.5 Economics of Processing Paddy into Rice

Particulars	Rice milling process (Rs/Qtl.)			
	Conventional unit Capacity 5 Qtl/hr		Modern unit Capacity 30 Qtl/hr	
	Channel I	Channel II	Channel I	Channel II
Cost of Paddy	1437.50	1437.50	1521.60	1521.60
Processing cost	126.75	126.75	196.40	196.40
Marketing cost				
a) Rice	69.80	79.70	84.33	121.08
b) Husk	04.95	04.95	10.50	10.50
c) Bran	03.92	03.92	04.48	04.48
d) Brokens	02.62	02.62	04.50	04.50
e) Total	81.29	91.19	103.81	140.56
Total cost	1645.54	1655.45	1821.80	1858.56
Gross returns	1849.50	1849.50	2104.55	2104.55
Net returns	204.00	194.00	282.75	246.00

Table.6 Economic analysis of value added products of sorghum

Products	Output cost (Rs/kg)	SKU in grams*	Price of alternative products in market (Rs/SKU)	Proposed price		Difference in prices* (%)	Profit margin (%)
				Rs/SKU	Rs/Kg		
Flakes	30.96	500	20.0	20.0	40.0	0.0 (on par)	29.20
Vermicelli	50.15	450	22.0	22.50	50.0	2.27 (more)	- 0.30
Multigrain <i>atta</i>	27.52	1000	36 – 42 (different brands)	30.0	30.0	16.67-28.57 (Less)	9
Fine rawa (Idly)	36.86	500	10.0-12.0 (different brands)	20.0	45.0	16.67-40.0 (more)	10.05
Pasta	28.13	200	36.0	18.0	90.0	50.0 (less)	219.94

Table.7 Syrup production from sweet sorghum: comparison with sugarcane

Particulars	Sugarcane	Jowar
Duration (days)	Seasonal Pre-seasonal Adsali	360 420 480
Fertilizer requirement N: P: K (Kg/ha)	Seasonal Preseasonal Adsali	250: 115: 115 340: 170: 170 360: 170: 170
Amount of water required (mm)	Seasonal Preseasonal Adsali	2000-2200 2500 3000-3500
Commercial cane sugar produced (T/ha-season)		9.4
Cost of cultivation of stalks (Rs./ha - season)		2.4
		46,355
		23,245

Table.8 Problems in value addition as perceived by the respondents

Sr. No.	Problems	Number of farmers (n=60)	Per cent
1	Lack of standardization of the products		
	Agree	53	88.33
	Disagree	07	11.67
2.	Tough competition with existing products		
	Agree	60	100.00
	Disagree	00	00.00
3.	Availability of market information		
	Adequate	21	35.00
	Inadequate	39	65.00
4.	Illiteracy		
	Agree	34	56.67
	Disagree	26	43.33
5.	Lack of technical guidance		
	Agree	47	78.33
	Disagree	13	21.67

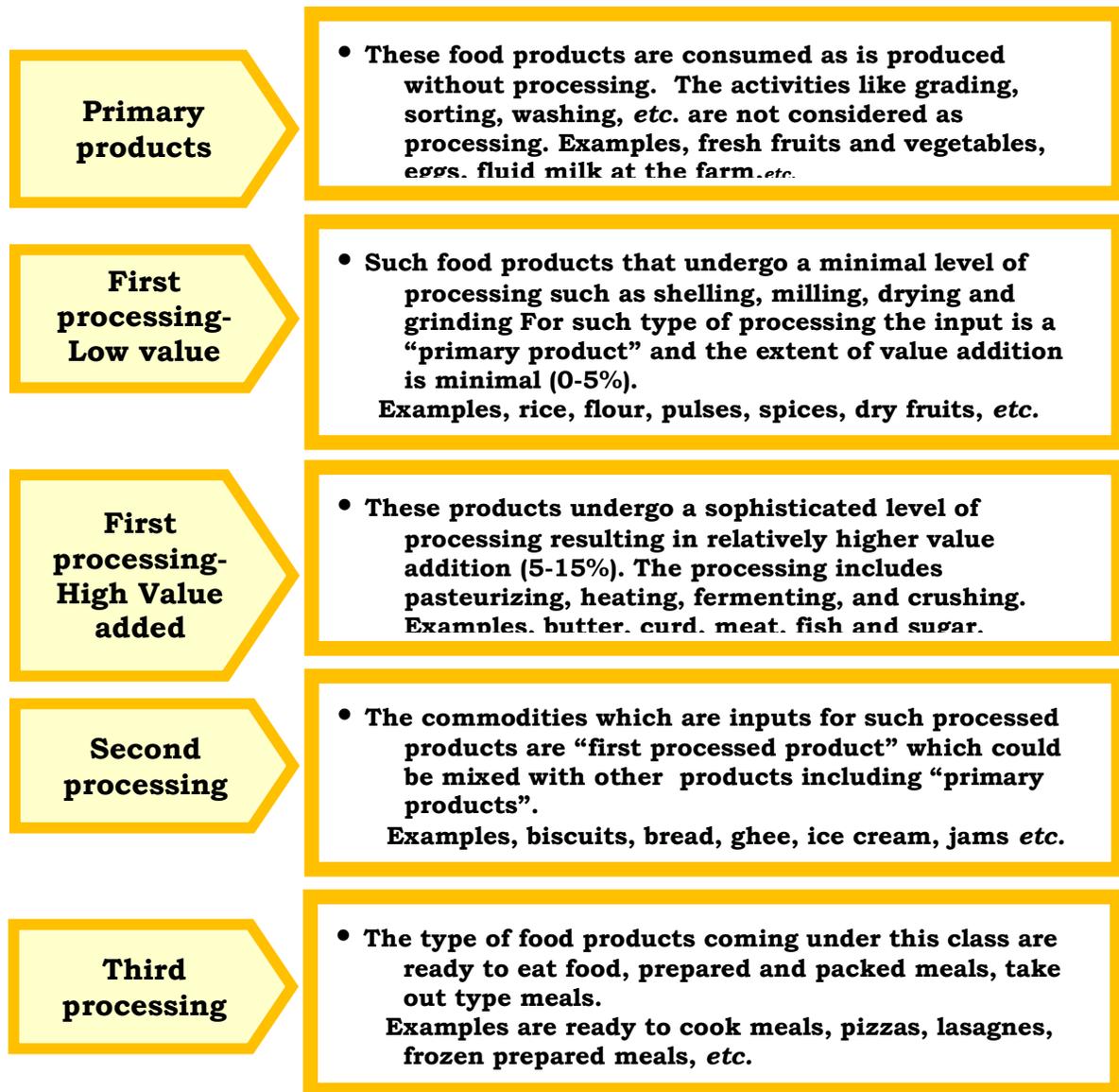


Fig.1 Various value added products of Sorghum





Value gain to each of the stakeholders in the supply chain

Earning/month of stakeholders in the supply chain.

Shwetha *et al.*, (2011) in their study Economics of paddy processing: A comparative analysis of conventional and modern rice mills in Karnataka revealed that regard to rice milling process, from the sale of all the products obtained from processing one quintal of paddy fetched Rs.1849.50 in respect of conventional units (same for channel-1 and channel-2) and ` 2105.55 in modern units. This difference in gross returns between two types of mills could be attributed to higher yield of head rice and better price enjoyed by the modern mills. The cost of paddy was higher for the channel-2 compared to channel-1 for both conventional and modern units. The higher cost of paddy in respect of channel-2 was on account of commission charges paid by the mills. The processing cost per quintal of paddy was Rs. 126.75 for conventional units and Rs. 196.40 for modern units. The higher costs associated with power, fuel and water charges were mainly responsible for higher processing costs in respect of modern mills. The total marketing costs were higher in channel-2 as compared to channel-1 in respect of both conventional and modern units (Rs. 91.91 as against Rs. 81.29) and

modern units (Rs.140.56 as against Rs. 103.81). The differential marketing costs between channel-1 and channel-2 were mainly on account of the costs associated with transporting rice to the markets. The implications of all these in rice milling was that the conventional units could get the net returns of Rs. 204 in channel-1 and Rs. 195 in channel-2 by converting one quintal of paddy into rice. The corresponding results were Rs. 282 and Rs. 246 for modern units.

Asodiya (2014) reported that, the cost per quintal of bakery products of wheat in Gujarat recorded on the basis of before baking and after baking was Rs. 4621.31 and Rs. 7474.30 for small firms and Rs. 3400.38 and Rs. 7595.29 in case of medium firms. The input output ratio for small and medium firms was 1:1.22 and 1:1.43, respectively. In case of flour mill unit the cost per quintal of flour products recorded on the basis of before grinding and after grinding was Rs. 2227.70 and Rs. 5135.00, respectively

Nimbkar *et al.*, (2006) presented pioneering developmental work on syrup production from sweet sorghum and they concluded that Sweet sorghum has less water and fertilizer requirements and hence lower cost of cultivation than sugarcane (Table 7). Sweet sorghum can be an additional or an alternative raw material to sugarcane. In

most situations, it will be a supplement rather than a substitute for sugarcane. Sweet sorghum [*Sorghum bicolor*] is the best multipurpose crop for simultaneous production of (i) grain from its Earhead as food, (ii) Sugary juice from its stalk for making syrup, jaggery or ethanol and (iii) bagasse and green foliage as an excellent fodder for animals, as biomass for gasification system, as organic fertilizer or for paper manufacturing.

Kusuma *et al.*, (2013) Studied various constraints faced by farmers from Karnataka in value addition, majority of the respondents have given Lack of standardization of the products, Tough competition with existing products, Inadequate Availability of market information and Lack of technical guidance as major constraints faced by them. The data pertaining the constraints in value addition as perceived by respondents is given in Table 8.

As the amount of value addition increases, the share of producer (farmer) in consumer rupee diminishes because of higher marketing costs and margins taken away by traders, processors, wholesalers and retailers. Returns for farmers can be increased by either reducing the number of intermediaries or by integrating the farmers with value addition. The development of food processing activity as a cottage industry or home industry results in increased value of raw materials, employment and increased income for respondents. Therefore, there is a need to support rural based food processing activities through the provision of the required equipment for preservation and processing.

Farmers should be encouraged for Integrated Intensive Farming System (IIFS) including

Rural-based Processing for better return and quality produces/ products. It will enhance their total income and thereby the living standards

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