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CONTRIBUTION OF VALUE ADDITION TO AGRICULTURE DEVELOPMENT- A CASE OF COCONUT INDUSTRY IN TIPTUR, KARNATAKA

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Abstract: *Processing of agricultural produce is a well-known agro-industrial activity. Agro-industries were essentially perceived as first level post-harvest processing of farm produce. The transformation and preservation of agriculture commodities through altering physical and chemical characteristics and packaging has manifold contribution to economic development. However, value addition is only seven per cent in India as against 23 per cent in China and 88 per cent in United Kingdom. However, research studies focusing on quantifying the benefits of value addition is limited. Hence, an attempt is made in this research study to quantity the benefits of processing and value addition of agriculture commodities. For assessment, value chain of coconut in Karnataka is chosen for the study. Since, Karnataka produces more than 65 per cent of DC production in the country, contribution of DC to agriculture development is considered for the analysis. About 70 small and large scale factories processing coconut to DC are located in Tiptur taluk of Tumakuru district. The major cost of processing coconut to DC is the cost of raw material with a share of 86% followed by labour cost. The average operational cost of processing/day for a small unit which process is Rs. 34,873 while that for a large unit is Rs. 2,06,972 and the net returns was Rs. 18, 595 and Rs. 2,01,709 / day for small and large units respectively. The income generated by value addition through employment is estimated at Rs 30 crores/annum while the income generated through backward linkages was estimated to be at 170 crores/annum. Though there are increased opportunities for processing agriculture commodities, in Karnataka only one percent of the horticultural commodities are processed. In view of the post-harvest losses and loss in storage, a comprehensive value chain analysis for potential agriculture and horticulture commodities are to be conducted. This will enable to suggest suitable policies for processing and value addition of agriculture and horticulture for overall development of the agriculture economy*.

Keywords: *Coconut, Value Addition, Desiccated Coconut, Employment, Up-grading*

1. INTRODUCTION

The last few decades have seen significant changes in consumption habits in India. With increasing purchasing power, consumers are becoming more health and quality conscious. Urbanization, growing numbers of working women, diversification of diets, and the growth of the middle-class have increased demand for ready to use (RTU) food products or convenience foods. The value of the market for processed food in India is growing at 25% per annum, and will reach $330 billion by 2015. Value addition in the form of fortification, beverages, dairy products, pickles, jams, sauces are some categories of processed food items which has evidenced increasing demand. However, the value addition is only seven per cent in India as against 23 per cent in China and 88 per cent in UK.

Processing of agricultural produce is a well-known agro-industrial activity. Agro-industries were essentially perceived as first level post-harvest processing of farm produce. Agro-industry processes materials of plant or animal origin by transformation and preservation through altering physical and chemical characteristics and packaging. It has manifold contribution to economic development. It transforms raw material into finished products for consumption; constitutes a significant proportion of the developing countries' manufacturing production and exports and develops food system that provides the nutrients critical for the wellbeing of the expanding population. As agriculture production increases, the demand and necessity of agro-processing increases. Conversely, new processing activities can open up new opportunities to farmers, and thus, create additional revenues for them. By creating new market for farm products, it can boost income of small/subsistent farmers. Agro-industry, play a pivotal role in rural industrialisation, provides significant and long-term development stimulus to rural populace. When agro-industry creates backward demand, farm employment usually increases. This is indeed an important outcome, since agriculture is the primary employer in the developing countries. Further, it creates jobs in sectors like transportation, distribution and retail trade as well. Addition of value in the production, harvesting, primary and secondary processing, packaging and export of agricultural produce form a value chain has strong linkages either directly or indirectly to livelihoods. (Ngore et al., 2011). Processing also determines effective utilization of harvested produce and the quality of the end product affects the consumption and acceptance of the product.

To promote value addition and postharvest processing, the Ministry of Food Processing Industries, Government of India has launched several initiatives such as provision of subsidy for investment in plant and machine to micro and small manufacturing enterprises; setting-up of cold chain as a part of strategy to develop the industries and integrated value chain project; credit linked back ended capital investment assistance; venture capital assistance in form of equity to agribusiness projects and promotion of innovation, entrepreneurship and agro industries. Similarly, food processing sector has been identified as a thrust area for development needs of huge investments in logistics for supporting the value chain from farm to plate. Similarly, Department of Agriculture in Karnataka is implementing the agro-processing scheme under which various agro processing equipments are made available to farmers, self help groups and farm women at subsidized rates. Significant efforts are made to add value to agriculture commodities in a value chain mode and integration of farmers in agriculture value chains. However, research studies focusing on quantifying the benefits of value addition is limited. It is in this perspective, an attempt is made in the research study to understand and evaluate the benefits of processing and value addition of agriculture commodities. For assessment and evaluation, the value chain of coconut in Karnataka is chosen for the study.

Coconut provides food and livelihood security and employment opportunities to a major segment of the rural population in India. It is estimated that the crop contributes to more than rupees 83,000 million to the country's GDP and about sixper cent to the edible oil pool. About 10 million people are dependent on coconut farming and its allied activities. The industry also helps to earn foreign exchange to the tune of Rs.13,000 million per annum by exporting coconut and coconut products (Approach paper for 12th five year plan). The processing industry is credited with supporting women workers for employment. The coir industry provides employment to 0.6 million workers with women constituting about 80 per cent of the workforce. More than 10 million people in India are engaged in coconut cultivation, processing, marketing and trade related activities (Lathika and Kumar, 2005)

Nearly 90 per cent of coconut production is meant for traditional use in domestic markets. Coconut oil has been the most important commercial product for trade in the country and hence the supply and demand of coconut oil determines the price of coconut. The grated

coconut is an essential ingredient in many culinary preparations. Copra or the dried kernel is the richest source of cooking oil and is used for cooking, as hair oil and body oil. Coconut oil derivatives are used in most of the cosmetic products and have wide applications in various edible and non-edible sectors. The tender coconut is used as a nutritious health drink and is a base for many ayurvedic preparations.

Karnataka and Andhra Pradesh account for more than 90 per of area and production in the country. In Karnataka, Tumakuru district has the highest area under coconut cultivation. Because of diverse agro-climatic conditions, agriculture and horticulture activities are widely practiced. The district is popularly referred to as *Kalpatharu Nadu,* a name associated with coconut. The *taluks* of Gubbi, Tiptur, Thruvekere and Chicknayakanahalli in Tumakuru contribute to 80% of the area under coconut cultivation (Basavaraj, 2016). Apart from coconut being sold in Agriculture Produce Market Committees (APMC) for household consumption and religious purpose, coconut processing is confined to mainly production of copra, oil extraction, and manufacture of coir and coir products. The sustained efforts of Coconut Development Board (CBD) during 90's for product diversification of coconut has led to development of value added products such as virgin coconut oil, coconut milk and milk powder, snowball-tender-coconut, vinegar, coir based products, coconut shell coconut wood based products, coconut chips, packed tender coconut water and desiccated coconut (DC).

1.2 Desiccated coconut

Coconut meat which is shredded and dried to remove moisture is called desiccated coconut. One of the most common forms of DC is an unsweetened, powdery product which is produced by drying shredded coconut and then grinding the shreds. Production of DC started in the country way back in 1952 (Singh 1998). DC can be stored at room temperature and is used in the preparation of chocolates, dusting for the outer layer of sweets, cakes, muffins etc., and in the preparation of puddings and ice cream. About 4000 tonnes of DC is manufactured annually in India (Banu, 2013). Also, the DC is important source of foreign exchange. The export revenue over the decade has increased by 55.43 (table 1). European and American countries are major market for DC and constitute over 72 per cent of the international market (CBI, 2017).

Table 1. Desiccated coconut export from India

Year	Qty (M t)	Value (Rs lakh)
2006-07	312.06	72.17
2007-08	1454.73	274.04
2008-09	2173.29	458.88
2009-10	2050.56	464.16
2010-11	4189.73	952.69
2011-12	5173.48	2308.00
2012-13	3004.22	1464.51
2013-14	5165.71	3868.57
2014-15	2606.34	4242.29
2015-16	4260.97	5260.61

Karnataka produces more than 65 per cent of DC production in the country (Tejaswini, 2009). Tiptur in Tumakuru district which is famous for production of edible ball copra is also famous for production of desiccated coconut. About 60-70 medium to large industries processing coconut to DC are located in Tiptur. The taluk produces more than 31 per cent of DC produced in the country. The DC produced is sent to Madhya Pradesh, Delhi, Uttar Pradesh and other north Indian states of India for confectionaries, bakeries, ice-cream industries. It is estimated that about 30 per cent of the DC produced in India is consumed by the organized sector. Britannia Industries Ltd., Parry and company, Afoods, Ampro products, Morten confectionaries, Ravalgaon Confectionaries, HLL etc are the main consumers of DC in the country (Aravindakshan, 1995). Hence, the value chain of DC was chosen quantify the benefits of value addition. The specific objectives of the study are to map the value chain of coconut; study the economics of processing coconut to DC and evaluate the contribution of value addition to income and employment.

2. METHODOLOGY AND DATA SOURCE

Tumakuru district alone produces over 32 per cent of coconut produced in Karnataka state, with an annual production of over 802245 lakh nuts during 2015-2016 (GoK, 2015). Tiptur stands in the top position among all the taluks in Tumakuru district in coconut production. Tiptur is a major hub for ball copra trading. About 70 small and large scale factories processing coconut to DC are located in Tiptur. With average temperature ranging between 15^0c and 38^0c, the taluk provides an ideal hot and dry climate favourable for DC industry.

Snow ball sampling procedure was used to make a list processing factories. During the process of selection, based on crushing capacity, factories were selected to represent small, medium and large scale factories. Accordingly, nine factories representing three each of small, medium and large scale factories were selected for the study. Data pertaining to crushing capacity, labour utilization for processing, operational and maintenance expenses, by-products obtained, marketing, return on processing and volume of sales was collected from the proprietors of the factories through personal interviews using structured questionnaires. The survey was conducted during 2016.

Valuelinks approach of the GIZ was adapted for mapping the value chain of coconut (Figure 1). To compute the value added by the processors, profit generated by processor was considered after deducting all the costs incurred in processing coconut to desiccated coconut. The contribution of value addition to employment was computed as the average number of people employed by a factory to process 1000 nuts per day. The amount of income generated through value addition to process raw nuts to DC was considered as the economic contribution. Income generated through backward linkages such as wood, electricity, diesel and value of the by-products such as broken shell, scrapped chips of coconut and soap oil was also considered for value addition contribution.

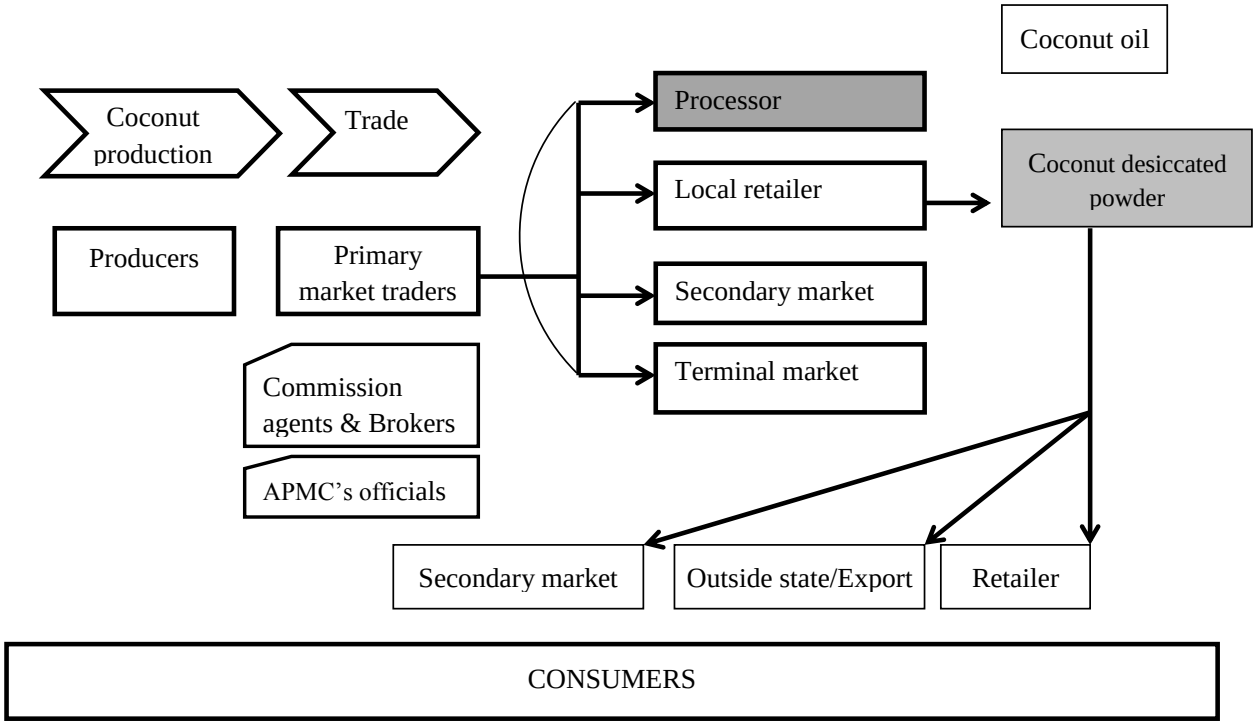

Figure 1.

3. RESULTS AND DISCUSSION

3.1 Processing of raw nuts to desiccated coconut

Fully matured coconuts of about 12 months are used for the preparation of DC (FAO , 1999). The processing of raw coconuts to DC involves breaking of the nut, scrapping the outer layer, washing, shredding and drying. Initially, the coconuts are de-husked and their shells are removed. The brown portion of nuts is removed by scrapping it to form coconut parings. About 10-15% of the kernel goes as parings which are further pressed to extract oil. The scrapped kernels are then washed, powdered and dried in ovens at 80-90°C for about one hour to bring down the moisture content to below 3 per cent. After drying, the powder is sieved to different sizes and graded. The graded powder is packed in moisture proof polythene bags of 1 kg for retailing and 25 kg for wholesale. DC is used as a substitute for fresh coconut and is also used in preparation of confectionery cakes, pastries, desserts and other coconut based recipes.

3.2 Value addition of coconut to desiccated coconut

On an average, small scale factories run for 180 days with crushing capacity of 5000 nuts per day or with an annual production of 100 metric tons (m t) of DC while the large scale 30,000 nuts/day with production of 1200 m t of desiccated coconut. The medium sized units operate for 240-250 days with crushing capacity of 20,000 nuts/day (table 2). The major cost of processing coconut to DC is the cost of raw material with a share of 86%. The next highest cost for processing is labour. Processing coconut to DC is labour intensive and is highly skilled. The primary labour activities are de-shelling, peeling the kernel, and washing. On an average about two labours are required for de-shelling and peeling of 1000 nuts/day. The average operational cost of processing per day for a small unit which process 5000 nuts per day is Rs. 34,873 while that for a large unit is Rs. 2,06,972 which processes 30,000 nuts/day. The investment made for the establishment of DC units which includes investment on land, building, machinery and power installation are not considered for the cost of processing. On a kilogram basis, the cost of DC is the least for large units with Rs. 51.74 due to scale economies while that for a small unit it is Rs. 60.64.

Table 2. Economics of processing coconut to desiccated coconut

	Type of factory		
Indicators	**Small scale**	**Medium scale**	**Large scale**
Crushing capacity (nuts/day)	5000	20,000	30,000
Crushing window (days)	180	240	300
Cost of raw material (Rs)	30,000	1,20,000	1,80,000
Cost of processing			
Labour (per day)	2150	12,000	12,600
Cost of electricity/wood/diesel	1500	3441	6000
Total operational cost of processing	3650	15,441	18,600
Cost of packing, branding & marketing	1150	4000	8000
Total cost of processing / day	34,873	1,39,750	2,06,972
Total cost of processing / kg	60.64	69.87	51.74

3.3 Returns from processing coconut to desiccated coconut

With crushing capacity of 30,000 nuts/day for large units and 5000 nuts/day for small units, the DC produced per day is 4 tons and 0.57 tons respectively. The price realized during 2016-17 was in the range of Rs. 80- 110 / kg. After accounting for the value of by-products realized (parings, broken shell and soap oil), the net returns was Rs. 18, 595 and Rs 2,01,709 / day for small and large units respectively (Table 3). The benefit cost ratio of large scale units processing coconut to DC are higher than medium to scale units due to scale economies. The benefit cost ratio for large scale units is 2.23 while that for small units it is 1.73. Though it is remunerative to process coconut to desiccated coconut, there are several constraints for expansion. Processing of DC is highly labour intensive, skill oriented and is carried out by women labour. De-shelling of coconut and removing the outer layer of kernel requires skilled women which are in short supply. Capacity enhancement through skilling will enhance the opportunity for employability of labour and also increase employment.

3.4 Contribution of value addition to income and employment

It is well recognized that value addition initiatives generates several opportunities to generate income across stakeholders. Hence, efforts are made to capture benefits of value addition across stakeholders of coconut economy through processing coconut to desiccated coconut.

Table 3. Returns from processing coconut to desiccated coconut

	Type of factory		
Indicators	**Small scale**	**Medium scale**	**Large scale**
Nuts crushed/day	5000	20000	30000
Value of by-products[1]			
Broken shell	2250	5000	12500
Soap oil	120	1100	1100
Parings	2275	7800	9100
Total value of by-products	4645	13900	22700
Output / (kgs)	575	2000	4000
Price of DC(Rs/kg)	80-110	90	100
Gross returns	51,750	1,80,000	4,00,000
Total cost	34,873	1,39,750	2,06,972
Net returns/day	18,595	39,060	2,01,709
Benefit cost ratio	1.73	1.50	2.23

The stakeholders involved in processing of coconut to DC are farmers, processors, labourers and backward linkages through industries such as machinery, wood, plastic for packaging, electricity, diesel, banks for loans. From a macro perspective, to capture the income generation from value addition of coconut, the cost of processing, value of the by-products and net returns are computed by considering average across small, medium and large units. The averages are then multiplied by the number of units operational in Tiptur with average operational processing window of 250 days/annum. Accordingly, the income realized for farmers from the sale of coconut to the processing industry is estimated at Rs 1500 crore/annum while for processors is estimated at 1260 crores/annum (Table 4). Increasing income of rural households through non-farm activities is an important strategy to reduce labour migration to urban areas and for sustainable rural development. The income generated by value addition through employment is estimated at Rs 30 crores/annum. However, the translation of increase in employment and income to socio-economic development of the labour employed and multiplier effects of value addition are not analysed in the present study. The incomes generated for subsidiary activities such as sale of wood for processing, electricity, steel, plastic etc is estimated at 170 crores/annum.

[1] Note: The by-products realized in processing coconut to DC are the parings (outer brown portion or testa of coconut kernel) which yields 13-14 kgs for 1000 nuts processed sold at Rs. 35-40/kg, the shell or the outer covering of the kernel which yields 135 kg for 1000 nuts de-shelled sold at Rs.6-7/kg and soap oil 3-5 kg sold at Rs 30/kg

Table 4. Increase in income and employment from value addition

Indicators	Value (Rs. crores)	Share (%)
Income from raw material	1500	53.94
Income enhancement	1033	37.14
Employment	30	1.08
Backward linkages	170	6.11
Income from by-products	48	1.73
Total income	2781	100

4. CONCLUSIONS

Value addition is primarily a demand driven activity and enhances the value of the commodities either through change in form, place or time utility. Convenience, choice, quality and health consciousness are the other emerging factors for increasing demand for value addition. The benefits of adding value to the commodities realized by various stakeholders are in-terms of access to markets, increase in shares of the consumer rupee, increase in income and employment, reducing risk, product diversification and differentiation etc. The present research study has made an attempt to highlight the benefits of value addition by choosing processing of coconut to desiccated coconut. The study has shown the processors realize 37 per cent of the total income generated from of value addition, about six percent is through backward linkages and 1-2% is in terms of income from employment.

Though there are increased opportunities for processing and value addition, the value addition of agriculture commodities in India is only 7 per cent as against 23 per cent in China and 88 per cent in UK. In Karnataka, only about 1% of the total production of fruits and vegetables is currently being processed for value addition. About 25 – 30% of post harvest loss is estimated due to inadequate cold storage, required transport, poor handling, insufficient processing and other value addition facilities. An estimated Rs. 50,000 crore is lost annually in the marketing chain due to poorly developed storage infrastructure. Hence, a comprehensive value chain analysis for potential agriculture and horticulture commodities are to be conducted which will help in understanding the constraints, identify opportunities for up-grading and suggest suitable policies for processing and value addition of agriculture and horticulture for overall development of the agriculture economy.

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