



Techno-Economic Feasibility of Agro Processing Centre on Custom Hiring of Primary Processing Equipment for Turmeric by Rural Youth Group

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Agro processing activities in rural areas can add value to the commodity by integrating primary production and food processing systems, increase the profitability and sustainability of production systems and also generate rural employment. Primary processing of turmeric by conventional method is laborious and time consuming in the rural areas. The time taken and the drudgery involved is more in this process and due to labour shortage, the farmers' face difficulties in carrying out the boiling operations during the turmeric harvesting season. Considering the bottle-necks in large scale turmeric processing in rural areas, it was found necessary to promote entrepreneurship development among the rural youth by custom hiring of the improved machinery for turmeric boiling and polishing. An enterprising village youth group was identified for carrying out the activities under Agro Processing Centre. The rural youth group had initiated the revenue generation activity by means of custom hiring of the turmeric processing equipment viz., steam operated turmeric boiler and turmeric polisher in and around the selected area of Coimbatore district where turmeric is predominantly grown. The group generated revenue of Rs. 251870 in two years by custom hiring of turmeric processing machinery.

Key words: APC, Turmeric processing, Turmeric boiler, Turmeric polisher, Custom hiring

Surplus production of any commodity affects the market price of that commodity, often resulting in selling price less than production cost. Processed product requires less space compared to raw product, adds value to the product and also enhances the livelihood. In India, the present status of food processing is very low and there is a scope of increasing the processing of agricultural commodities. Post harvest processing is a necessary step in conversion, value addition and loss prevention. Processing of commodities at the village level will not only prevent the losses but also generate employment opportunities to the local people. Agro processing activities at the village level could create forward and backward linkages of agriculture and industries. Indian economy is based mainly on agriculture, with over 65 per cent of the population being involved in this sector. No enterprise will be better than agricultural produce based endeavors for rural development.

The lowest and highest monetary values of a food commodity are respectively when it is in raw and fresh form; and when it is processed, in processed and ready to eat form. Selective mechanization, appropriate post harvest management and value addition in the production areas, lead to employment generation in the rural sector and prevention of post harvest losses. Rural people have been engaged in traditional processing of farm produce, which is often laborious and time consuming. They also involve drudgery and result in poor quality products due to

manual methods of processing. Agro processing can expand local markets for primary agricultural products, add value by integrating primary production and also minimize post harvest losses. Agricultural processing units in the form of private enterprises or co-operatives are the key elements in successful marketing strategy (Urs Heierli and Thomas Gass, 2001). Promoting entrepreneurship among rural youth for operating Agro Processing Centre by custom hiring will be a step forward in this direction.

Materials and Methods

Concept of Agro Processing Centre

The rural sector of India is rich in resources, but they are scattered. The socio-economic condition of the people does not allow them to use the resources to their benefit. To organize this sector, an integrated approach is required. To provide direct benefit, the agro based processing activity at village level can play a major role. Selection of activities under the APC depends on the availability of raw material and resources. Farmers are not aware of post harvest care and technology. There are no processing industries in rural areas to get better returns before releasing the produce to market for sale. (Narayana Rao, V, 2001).

Agro Processing Centers facilitate primary and secondary processing of certain agricultural commodities on rental/ payment basis to the rural poor. The center would procure and use the excess

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produce of a village or a cluster of villages and provide income and employment to rural people. Starting of a business to earn profit is the main concern of the rural entrepreneur. There are several problems of socio-economic, political, financial, administrative and technical nature to establish rural agricultural enterprises. The basic steps involved in setting up of APC are planning, execution, installation, production, implementation, and marketing.

Role of rural group

An effective interactive coupling, linking Research organization, NGO, community organization and individual farmer can contribute greatly towards the development of small and medium scale food processing units in rural India thereby improving the rural economy of the country.

Selection of village for conducting the study

An enterprising village youth group, consisting of six male members, in the age group of 30-35 years, of the village, Sangampalayam, of Avinashi taluk of Coimbatore district, was identified for carrying out the activities under Agro Processing Centre. Their education level was from higher secondary to college degree. All the members were from the farming background having their own agricultural lands. The members were keen on starting up a rural enterprise in their village. The total number of villages in the Avinashi taluk was 34 and each village is situated at 10 km radius. The major crops cultivated are turmeric, banana, tapioca, onion and vegetables. The village is well connected with good roads. The village had access to the nearby markets such as Avinashi, Annur, Mettupalayam, Tirupur and also Erode. Besides, certain commodities like banana and tapioca are also taken by the traders from Kerala.

Identification of processing equipment for rural entrepreneurship

Several meetings were held with the group members to discuss the need and to explore the scope for setting up rural enterprise in the village. The post harvest interventions required for the surplus commodities grown in and around the village were analysed during the discussions. The major agricultural commodities are turmeric, banana, tapioca, onion and vegetables like brinjal, tomato and lady's finger. Among the above listed crops, primary processing of turmeric was identified initially for execution of a rural enterprise in the village. Turmeric (*Curcuma longa*) is an important spice in India. A well managed turmeric crop comes to yield in 12 months and digging uproots the rhizomes. The harvested rhizomes undergo curing, which involves various processes like boiling, drying, polishing and colouring. Turmeric is a tropical herb and can be grown on different types of soil under irrigated and rainfed conditions. It is a shade tolerant crop with shallow roots suitable for inter cropping and also as a component crop in the homesteads where low to medium shade is available. Traditionally turmeric

processing is carried out by boiling the rhizomes in a pan under open hearth. The time taken and the drudgery involved is more in this process and due to labour shortage, the farmers face difficulties in carrying out the boiling operations during the peak season. Custom hiring of the turmeric boiler to the farmers could fetch revenue for the village youth. So also in the case of turmeric polishing, adoption of a mobile turmeric polisher could aid in income generation under custom hiring. (Table 1)

The machine matching (Table 2) was carried out based on the availability of raw material for turmeric processing in the APC catchments and working capacity of the machines. (Mangaraj and Ranjeet Singh, 2006)

Table 1. Raw material available for turmeric processing

Parameters	Particulars
Net cultivable area , ha	40
Total production, t	2800
Seed requirement, t	10
Domestic consumption, t	280
Losses, t	280
Available for processing, t	2230

Description of equipment:

i) Steam operated turmeric boiler:

Boiling is the first post harvest operation to be performed in the farm level. In the traditional method of turmeric boiling, cow dung slurry is being used in open vessels which lead to unhygienic condition and lower price of the produce. This could be overcome

Table 2. Machine matching

Machine	Turmeric Boiler	Turmeric Polisher
Capacity, kg/h	1250	800
Working time, h/day	24	8
Working days/year	50	75
Available for processing,t	2230 (fresh)	446 (dried)
Number of unit required	1	1

by adopting a steam operated turmeric boiler. The machine is a mobile unit taken to the fields using a tractor. The steam operated boiler (Fig.1) consists of boiler of 200 litres capacity, furnace, chimney, blower and 6 drums for holding turmeric rhizomes. The water is heated by burning the agricultural waste in the furnace. The blower supplies atmospheric air for quicker heating of the fuel and is operated by 1 hp single phase motor. Water is pumped into the boiler. The water gets heated within an hour and the steam coming out of the tank is supplied to the individual drums through pipes. The capacity of each drum is about 100 kg of raw turmeric. The steam pipe inside the drums is provided with holes throughout its length for uniform supply of steam. The temperature maintained is about 90 °C. The pressure maintained for the operation of boiler is about 2 ksc for safety operation of the boiler.

ii) Power operated turmeric polisher

Dried turmeric rhizomes are polished for obtaining a smoother finish by removing the rough and hard outer surface and also for better appearance. There are two types of polishing, hand polishing and



Fig. 1 Steam operated turmeric boiler

machines are simple in operation and require less investment. The machine is also provided with knives for polishing action. Also pin like projections are being provided throughout the drum for better cleaning of the rhizomes. The capacity of the machine is about 1000 kg per hour and requires two people for operation (Fig.2).

Training on the turmeric processing technologies

The group was exposed to the processing technologies i.e., steam operated turmeric boiler and power operated turmeric boiler on the operation of

Fig. 2 Power operated turmeric polisher

the equipment under actual field condition (Fig. 3). In house and on farm hands on trainings were given to the SHG on steam operated turmeric boiler at Thamampatty, Salem district of Tamil Nadu, CIAE-IEP Centre and also in the farmers' fields at Sangampalayam village of Coimbatore.

Entrepreneurship Development through primary processing of turmeric

In this study, the rural youth adopted the technologies for large scale turmeric processing viz.,



Fig. 3 Training of SHG on steam operated turmeric boiler steam operated turmeric boiler and turmeric polisher for income generation through custom hiring of the same.

The total revenue, net profit, return on investment, and payback period were arrived for the custom hiring operation of both turmeric boiler and polisher based on the following expressions.

$$\begin{aligned} \text{Total revenue} &= \text{Total final product} \times \text{selling price of the product} \\ \text{Net profit} &= \text{Total revenue} - \text{total cost of operation} \\ \text{Return on investment} &= \frac{\text{Net profit}}{\text{fixed capital investment}} \times 100 \\ \text{Pay back period} &= \frac{\text{Fixed capital investment} - \text{working capital}}{\text{net profit}} \end{aligned}$$

Results and Discussion

Initiation of APC for turmeric processing

In order to purchase the primary processing equipment for turmeric like the steam operated turmeric boiler and the turmeric polisher, financial assistance through credit from a nationalized bank and subsidy to the tune of Rs. 1.6 lakh were arranged for the group.

Entrepreneurship development

The rural group had initiated the revenue generation activity in and around the identified village during the harvesting season of turmeric. The cost economics has been worked out and is presented in the table 3. The charges for boiling 100 kg of turmeric is about Rs.33, at farmers' end with steam operated turmeric boiler whereas, under conventional method of boiling the same works out to be Rs.62.50. Thereby

Table 3. Cost economics on turmeric processing through custom hiring

	Turmeric Boiler	Turmeric Polisher
Machinery cost, ₹	3,25,000	100000
Annual fixed cost, ₹	86450	20600
Annual variable cost, ₹	104988	72000
Total operating cost, ₹	191438	92600
Cost of processing, ₹	33	20
Break even point, kg	480256	69244
Return on investment, %	42	33
Payback period, y	1.78	1.8

Table 4. Revenue generation by custom hiring of equipment

Machine	I Year			II Year			Total revenue, ₹
	Hours of operation	Quantity, t	Net revenue, ₹	Hours of operation	Quantity, t	Net revenue, ₹	
Turmeric Boiler	564 h (47 days)	560	61200	1080 h (80 days)	1069	138970	200170
Turmeric Polisher	240 h (30 days)	27	13500	540 (60 days)	63	38200	51700
Total revenue generated through APC							251870

about 47 per cent savings on charges could be achieved where the farmers are benefited. In the case of polishing, the operating charges were 2₹ per 100 kg of dried turmeric rhizomes.

The return on investment for steam operated turmeric boiler was 42 % whereas for turmeric polisher it was 33%. The payback period for the both the equipment was about two years.

During the study, the steam operated turmeric boiler was operated for 47 days in the first year and 80 days in the second year fetching revenue of about ₹170. Similarly, the power operated turmeric boiler was operated for 30 days in the first year and for 60 days in the second year fetching revenue of ₹1700. The total revenue generated by custom hiring of turmeric boiler and polisher to the farmers' works out to be ₹1870 for the period of two years under study.

Conclusion

The rural group has been successful in carrying out the primary processing operations on turmeric by

using post harvest machinery under custom hiring. This APC programme has amply showcased the potential for such viable entrepreneurship ventures by village youth for sustainability and livelihood.

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