Entrepreneurship Development in Agriculture through Agro Processing Centre: a Case Study of Almora District in NW Himalaya

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ABSTRACT

This study was conducted by Vivekananda Institute of Hill Agriculture, Almora (India) to enhance entrepreneurship in the unemployed educated youths in North-Western Himalayas, who otherwise are migrating from hills in search of employment and livelihood. An agro-processing centre (APC) was established with the institutional support and was operational through an entrepreneur. The establishment cost of INR 2,19,000 was borne by the institute. The entrepreneur invested INR 1,66,255 for purchasing raw food grains. Total annual cost (Operational cost + Rental value of APC and storage building) was INR 27956. Annual income of INR 95,145/- was generated from sale of the processed products in brand name of "HIMRAJ" apart from generating income of INR 27,867 by providing processing service to the nearby farmers. This way he earned the INR 1,23,012 as gross income, where as net income was INR 81,356 per annum. This case study shows that if an entrepreneur maintains the APC in effectively, he can generate sufficient income from processing and value-addition of food grains. As a result of this, youths in hills can be self-employed and will not migrate from hills in search of employment and livelihood security.

Keywords: Agro-processing centre, food grains, rice milling, millet thresher-cum-pearler

1. INTRODUCTION

Green revolution has made possible self-sufficiency in food production in India from ship-to–mouth stage prevailing three decades ago. Public investment in infrastructure, research and extension during green revolution period, have significantly helped to expand food production and diversified the consumers food basket (Paroda and Kumar, 2001). Surplus production of any commodity affects the market price of that commodity, often resulting selling price at less than production cost. The transportation and storage of food grain is a costly affair. Along with edible parts, non-edible parts also are transported, which increases the cost of storage and transportation. Processing of these materials, resulting high to low volume would save the storage and transportation. Processed products require less space as compared to raw produce,

add value to the product and improve livelihood. Increasing income are always accompanied by a change into food basket (Gotait and Pradhan, 2006). Contemporary consumers prefer to purchase the value-added processed products for various reasons viz; saving of time to cook food, less storage space in small urban houses and better present-ability (Rosegrant et al, 2001).

After green revolution era, India experienced growth in processing industries but still this sector is in its infancy. In India, the present status of food processing is very low (less than 2%) (Annual Report, MFPOI, 2005-06). There is still a vast scope to increase the processing of food grains in India. This sector generates the demand for more food grains production resulting into more intensive agriculture. Increasing intensity of agriculture would result in more employment generation in rural areas (Kacharu *et al* 1998). Associated risk of migration and unbalanced urban-rural parity can also be tackled through this sector. Apart from generating employment in agriculture, this sector will directly generate employment opportunities within sector and more opportunities in service sector (Khem Chand *et al* (2006). Thus, the processing sector lately became very important sector for all round economic development. Keeping this in view government of India has established Ministry of Food Processing for strengthening this sector at national level, and also changed APMC act so that raw materials for this sector are easily available (Inter Ministerial Task Force, 2003).

Post harvest processing is a necessary step in conversion, value addition and loss prevention of agricultural produces. The processing of the food commodities at the village level will not only check the post-harvest losses but also provide additional employment (both direct and indirect) to the local people.

Processing of food commodities is an essential step in value addition. Rural people have been using traditional methods of processing which is often time and labour intensive. It is mostly done manually resulting into very small quantity and poor quality and also involves drudgery especially of women. The processed products have recently become more important because of consumers' preferences. Presently educated youth are migrating from hills to plain areas in search of jobs. Introduction of APC (Agro Processing Centre) resulted in value-addition, processing and provide regular source of income among the educated unemployed youths, directly and indirectly. Those persons, who are engaged in procurement, processing and marketing of the food grains, will directly be benefited by APC. Farmers, who are presently under employed, will try to increase his farm productivity by employing himself as labour in this occupation and can earn extra money. This will reduce the degree of his under employment. For increasing productivity farmers need better inputs and input supply chain will come up in the vicinity creating more employment in this sector. Similarly, in forward linkage, employment will be generated till processed produce reach to the consumers. For processing of food Government of India has established a separate ministry of Food Processing Industries for development of suitable support policies, technical advisory support and promotion of food processing in India. During 2005-06, government investment in this sector was planned INR 6500 million and expected FDI is about INR 3200 million (Annual report MOFPI, 2005-06).

To overcome the loss of quality and quantity, reducing the burden on transport for carrying non -edible parts of the grain, increase rural unemployment and reduce women drudgery in

processing, a model agro-processing centre was planned at village namely Takula in Almora district. Beside this centre was established also to demonstrate the strong linkages (both forward and backward) which would lead not only to generate direct employment but also to benefit the farmers by increasing their productivity, production and income.

2. MATERIALS AND METHODS

2.1 What is Agro-Processing Centre (APC)?

Agro-Processing Centre is an establishment, where required facilities for processing, storage, drying of cereals, pulses, oilseeds, spices, fruits and vegetables are available. Processed and packed food products are prepared and marketed with specific brand name (Kumar and Ilyas, 2003). The entrepreneurship of APC may be of an individual, community, cooperative or voluntary organization. The APC creates additional value to a product so as to increase marketability of surplus produce available in the village, cluster of villages or surrounding locality.

2.2 Need of APC

The food grain production in hills is not sufficient for year round consumption of the house holds, thereby compelling the farmers purchase food grains from nearby markets. This is due to low productivity, unscientific production techniques, lack of economic incentives and migration. One of the major reasons for low productivity is the rainfed farming, which account for about 90 % area in Uttaranchal (Srinivas and Kumar, 2006). Coupled with this the losses due to traditional processing further aggravates the problem. In such situation, APC can be helpful in processing, value-addition and loss prevention. Besides, APC can bridge the gap between producer and consumer by ensuring the availability of food products at proper time and at low cost. Moreover, the APC would create a market demand for fresh food grains which induce the farmer to produce surplus to earn more money, thereby, increasing the productivity. Thus, apart from loss saving APC would increase the productivity level of the region.

2.3 Prospects of Agro-processing Centre (APC) in Uttaranchal

Wheat is major crop in Uttaranchal (48.6 % area) followed by rice (35 % area), finger millet (17.2 %) and barnyard millet (8.5 %). The production of wheat, rice and finger millet is 745, 569 and 174 thousand tonnes, respectively (Table 1). Total area under spices production in Kumaon hills is 2798.1 ha. In which, the percentage area under chilies is maximum (45.90 %) followed by ginger (18.12 %), garlic (10.48 %), turmeric (10.13 %), coriander (6.4 %), fenugreek (5.36 %) and large cardamom (1.27 %) (Directorate of Horticulture, Uttaranchal, 2000). Commensurate to the production, the number of processing units for food grains is inadequate. Spices which need processing have large scope in Uttaranchal, due to their sufficient production (Table 2). The existing units are mainly engaged in fruits and vegetables processing (Table 3). Therefore, the establishment of APC is seriously felt need in the region for processing the farmers' produce, which would improve their income and livelihood in a sustainable manner.

Table 1. Area, production and productivity of cereal crops of Uttaranchal.

Crops	Area (000ha)	Production (000 t)	Productivity (kg/ha)
Wheat	397	745	1877
Paddy	293	569	1942
Finger millet	136	174	1279
Barnyard millet	73	69	950

Source: Fertilizer Statistics 2004-05.

Table 2. Production wise rank of major spices crops in Kumaon hills.

Rank	Spice-crops	Production (tonnes)
I	Ginger	5153.00
II	Turmeric	2004.00
III	Chili	874.40
IV	Coriander	248.90
V	Large Cardamom	63.30
	Total	10198.95

Source: Directorate of Horticulture Chaubatiya (UA)

Table 3. District-wise fruits and vegetable processing units in Kumaun region.

S.No.	Districts	Scale of units				Total
		Home	Cottage	Small	Large	
1	Nainital	10	4	3	1	18
2	US Nagar	0	1	0	2	3
3	Almora	3	2	0	0	5
4	Bageshwar	0	0	0	0	0
5	Pithoragarh	1	-	1	-	2
6	Champawat	2	1	0	0	3
	Total	16	8	4	3	31

Source: Directorate of Horticulture Chaubatiya (UA)

3. RESULTS AND DISCUSSION

3.1 A Model Agro-Processing Centre At Takula, Almora

A newly established model APC with the help of VPKAS (ICAR) at Takula village in Almora district was used to show different economic aspects of APC. The procedure followed during implementation of this ORP on APC is being discussed in detail.

3.1.1 Site Selection for APC

The following criteria were used to select a suitable site for APC

3.1.1.1 Location

As APC has to serve a platform as it would be early for collection and processing of food grains from nearby locality, therefore it should be well connected by good roads. It is more important in hills, because problem of poor transportation facility and scarce labour could be handled properly.

3.1.1.2 Availability of Surplus Raw materials

In hills, the raw material procurement is difficult as there are very few farmers who have surplus production, where as an APC has to get sufficient food grains for processing and marketing, if it has to run efficiently of the installed machines. Hence, sufficient availability of material needs thorough investigation before finalization of a site.

3.1.1.3 Presence of a Highly Populated Village

An APC must be situated in and around populated villages so that it can collect or purchase raw materials from the farmers. Moreover, the farmers can take the benefit of APC on rental basis. Thus, the centre can benefit the majority of hill farmers.

3.1.1.4 Presence of Vibrant Market

For proper benefit to be accrued, the presence of vibrant market in the nearby areas will be determining factors, because, it will absorb the processed products, which will enhance the turn over of the centre. Moreover, a nearby market can reduce the cost of transportation and other overhead costs, which will ultimately accelerate the profitability of the centre.

3.2 Principle of Agro-Processing Centre Establishment:

The basic principle of establishment of Agro Processing Centre is availability of surplus produce, which can be estimated by the following equation (Kumar and Ilyas, 2003):

$$\mathbf{S = Pt - (Un + L)}$$

Where,

S = Surplus Produce
P_t = Total Production
U_n= Total utilization of produce by the population to meet their various need
L = Total losses during various operations.

On the basis of availability of surplus produces, the type and capacity of processing centre, machineries and labour requirements are decided. The activities of APC can be decided on the basis of available raw materials, processed products and market potential. These activities could also be the basis for estimation of capital cost investment and requirement of land and building.

3.3 Steps for Establishment of Agro-Processing Centre

3.3.1 Prioritization of Commodities

The prioritization of commodities was done on the basis of the percentage area under the concerned crop. On the basis of prioritization, cereals, pulses, oil seed and spices were listed and a thorough discussion was carried out with the local people, potential farmers, opinion leaders and market functionaries. Finally, wheat, rice, finger millet, barnyard millet, lentil, soybean, bhatt, pigeon pea, linseed, mustard, turmeric, coriander and chilies were selected for processing, packaging and marketing with specific brand named "HIMRAJ".

3.3.2 Selection of Equipments

The equipments were selected on the basis of food and other commodities prioritized for the centre. During selection of APC equipments, some other considerations were weight, power source, ease in operation, safety in operation and ease in repair and maintenance.

3.3.3 Basic Characteristics Observed in Selection of Entrepreneur for APC

Entrepreneurship is the ability to take the factors of production (land, labour and capital) and use them to produce new goods and services (Stoner *et al*, 1995). The entrepreneurs perceive opportunities that other business executives do not see or do not care about. They see change as the norm and healthy trend.

3.4 Establishment of APC, Takula (Almora)

Suitable sites along with prospective entrepreneurs were explored in a systematic way in and around Almora centre for establishment of APC. A committee was constituted to select the entrepreneur and suitable site. After meeting with many young entrepreneurs' groups and survey of several sites were conducted. An NGO at Takula village was finally selected as key entrepreneur (third party) because of several advantages like location, availability of infrastructure and readiness to initiate APC. It is on the Bareilly - Bageshwer national highway which is centrally located and surrounded by cluster of villages. The site has most of the infrastructures like 3-phase power supply, water, road and vibrant rural market.

3.4.1 Equipment Installed at APC, Takula

Seven post harvest equipments and machines were procured and installed on their bankability and source as mentioned by Kacharu *et al* (1987). . The equipment installed at this APC was finalized on the basis of the requirement of the area, food grain surplus and its ease in availability to the centre. After thorough discussion with entrepreneurs, state officials and concerned scientists, machines with given specifications (Table 4) were found suitable, hence installed.

Table 4. Equipment installed at APC, Takula.

S No	Agro-processing Equipment and facilities	Approx. Cost ('000 INR.)	Technical Specification
1.	Mini Rice Mill unit (with cleaner, sheller and polisher) with 10 hp electric motor	75	Milling capacity: 2.0 q/hr Power source – 5 hp, 3-phase elect motor
2.	Grain cleaner/Grader	10	Cleaning and grading capacity: 1.0 q/hr Power source: one man or 0.5 hp single phase elect motor
3.	Mini *Dal Mill* (Pulse milling plant)	16	Milling capacity: 90.0 Kg/hr Power source: 1.0 hp single phase elect motor
4.	Grain mill (Plate type atta chakki of 300-350 mm diameter)	15	Grinding capacity: 100.0 kg/hr Power source – 5 hp, 3-phase elect motor
5.	Mechanical oil expeller (6 volt)	65	Expelling capacity: 40.0 kg/hr
6.	Millet thresher cum pearler	8	Threshing capacity: 35-40 kg/hr Pearling capacity: 70.0 kg/hr
7.	*Masala Chakki* (Spices grinder)	5	Grinding capacity: 5.0 kg/hr
8	10 hp Electric motor	25	3 phase electric motor
Total		219	

3.4.2 Layout

The lay out of place of equipments was done as per place available (Figure 1). For economical operation of all installed machines, it was necessary to run all the installed machines at the same time only by one power source, so the length of shaft was taken a little bit higher side from recommended length.

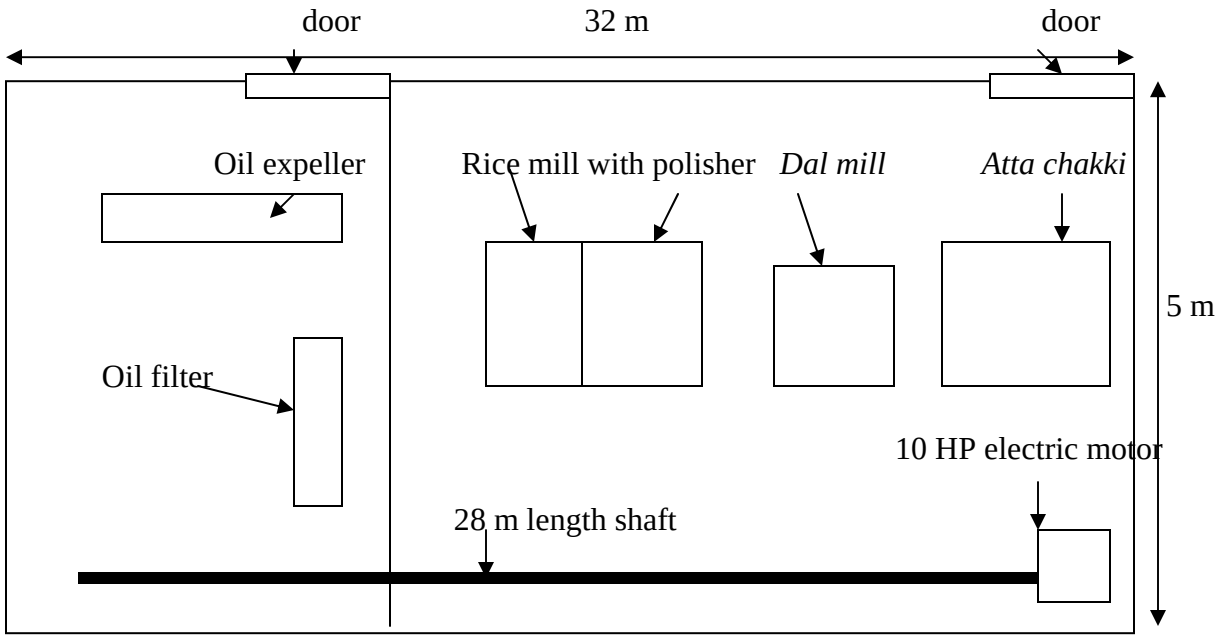

Figure 1. Layout of APC, Takula

3.4.3 Post Installation Precautions

For safe and smooth running of electric motor, 3-phase electric supply was considered to be most important. To detect different three phases 3 different colour indicator bulbs was installed. All machines were well grouted and tightened with nut and bolts. Electric panel was covered and easily accessible by the operator. The direction of the husk outlet of the rice mill was placed in such a way that it did not disturb others in vicinity and its collection method was suitably modified.

3.4.4 APC Marketing Strategy

APC has adopted two pronged marketing strategy. Firstly, it encourages local farmers to bring their raw materials for processing and charge for the services rendered. In second strategy which is more remunerative, the APC procured raw materials, processed it and packed it in proper packaging material. It was sold through a brand name called "HIMRAJ"(Figure 2).

Figure 2. Processed and packed product with brand name “HIMRAJ”

3.5 Economics of APC, Takula

The economic health of the centre is an important determinant for the functioning of the centre. The basic variables as suggested by Kachru *et al* (1986) were taken up in this study. Therefore, the entrepreneur was trained to maintain the different records, in which the data related to purchase, processing, and marketing can be recorded properly.

3.5.1 Annual Operating Cost of APC:

Based on the records maintained by the APC and cost of equipment supply an annual cost of operation was worked out for the APC. Annual depreciations for different machines were worked out by following formula:

$$Depreciation\,(Rs) = \frac{C - S}{LH}$$

Where,

C = Initial cost, INR
S = Salvage value (10 % of initial cost), INR
L = Useful life of machine, yrs
H = Time of per year use of machines, h

The annual depreciation for different machines was given in Table 5. This depreciation value along with annual rental value for the building constitutes the fixed cost of the APC. Table 6 depicts the fixed cost and variable cost which include electricity charges, actual maintenance and

repairing, manpower used to run the APC and overhead charges. Machine wise, total operational charges for APC were taken into account. Total cost of running APC was INR 27,956 out of which fixed cost component was INR 19,521 and variable cost was INR 8,434.

Table 5. Depreciations of different machines used in APC.

Agro-processing Equipment and facilities	Approx. Cost ('000INR.)	Expected age /year of operation (years)	Annual use (hours)	Depreciation (INR/annum)
Mini Rice Mill unit (with cleaner, sheller and polisher) without motor	75	10	300	6690
Grain cleaner/Grader	10	10	150	900
Mini Dal Mill	16	10	100	1440
Grain mill (Plate type atta chakki of 300-350 mm diameter)	15	10	255	1350
Mechanical oil expeller (6 volt)	65	10	100	5850
Millet thresher cum pearler	8	10	400	720
Masala Chakki (Spices grinder)	5	10	160	450
10 hp Electric motor	25	10	255	2250

Table 6. Annual Fixed and Variable costs in INR.

Annual Fixed cost			Annual Variable cost			
Equipments	Depreciation cost, INR/year	Rental value of building (INR)	Electricity Charge, (INR/year)	Annual maintenance and repairing charges, (INR/year)	Man power, cleaning, processing and packaging, (INR/year)	Over-head charge (INR /year)
Mini Rice Mill	6690	7200.00	(Total electricity consumption = 1912.5 units) Total charge = 5737.5	600.0	1 daily ways labour was for 4 months with payment INR 50 per day (4 hours per day)	
Grain cleaner/Grader	900			50.0		
Mini Dal Mill	1440			350.0		
Grain mill	1350			400.0		
Mechanical oil expeller	5850			100.0		
Millet thresher cum pearler	720			50.0		
Masala Chakki	450			200.0		
10 hp Electric motor	2250			100.0		
Total	19650	7200.0	5737.5	1850.0	6000.0	1218.0
Total annual fixed cost (FC) = 26,850			Total annual variable cost (VC) = 14,805.5			

3.5.2 Returns from APC

The entrepreneur has generated annual income of INR 95,145 from APC through sale of processed products. Wheat flour making maximum income (INR 64395) followed by paddy milling (INR 13500), and barnyard millet threshing and pearling (INR 10,000) and finger millet threshing and pearling (INR 3500) (Table 7). Though spices viz., coriander and chilies were also processed and sold but could not contribute considerably. The entrepreneur has generated additional annual income (Table 8) from APC through providing the service (INR 27,867) to the nearby villagers in which wheat grinding generated maximum income (INR 14,600) followed by rice milling (INR 6804), and oil extraction (INR 6205), respectively. Though spices grinding were also carried out but could not contribute considerably (INR 258). Thus, the entrepreneur NGO has earned total annual income of INR 1,23,012 from sale of processed products and services rendering activity to nearby villages.

Table 7. Annual income generation by APC through sale of processed products.

Commodity	Quantity purchased, Kg.	Quantity of Commodities remain unprocessed, kg	Processed material	Rate, INR/kg	Net input cost	Quantity of processed and sold Product	Processed product sell rate, INR/kg	Net output cost	Total Income, INR
Wheat	14310	0	14310	5.5	78705	14310	10	143100	64395
Paddy	9000	0	9000	8.5	76500	6000	15	90000	13500
Finger millet	3969	3469	500	5	2500	500	12	6000	3500
Barnyard millet	1821	821	1000	5	5000	600	25	15000	10000
Turmeric	200	160	40	40	1600	40	70	2800	1200
Dhaniya	70	40	30	35	1050	30	80	2400	1350
Chilli	50	20	30	30	900	30	70	2100	1200
Total					**1,66,255**			**2,61,400**	**95,145**

Table 8. Annual income generation from processing services provided by APC

Processing	Quantity (kg)	Rate (INR/kg)	Income (INR)	Percentage
Wheat grinding	7300	2.0	14,600	52.4
Rice milling	3402	2.0	6804	24.4
Oil extraction	1241	5.0	6205	22.3
Spices grinding	86	3.0	258.00	0.9
Total	**12029**		**27,867**	

Annual income from processed products (I_1) = INR 95,145
Annual income from service provided (I_2) = INR 27,867
Gross income ($I_1 + I_2$) = INR 1,23,012
Total annual input cost in APC (C) = Fixed cost (FC) + variable cost (VC)
= INR 26,850 + INR 14,806 = INR 41,656

Net annual income from APC = $(I_1 + I_2) - C$ = INR 81,456

Net annual income generated from the APC is INR. 81,356/-, which is very healthy sign for an agro-processing unit. The raw material for processing was obtained from nearby villages in Almora and Bageshwar for which, the entrepreneur NGO is paying 10-20% higher than prevailing market price to the farmers. The entrepreneur has promoted intensive and modern farming in nearby villages so that productivity and production of villagers are improved and more surpluses for processing can be generated. This is a major intangible advantage of agro-processing and value-addition.

4. CONCLUSION

The case study showed that APC can play a vital role in not only preventing the post harvest losses of farm produces, but it can also help in providing the employment and income to the rural youths. Strong forward and backward linkages are established to procure raw material and to sell processed food material. This has not only generated income to NGO but also has triggered development process in terms of improved agricultural practices for sustainability and food surplus. APC would also provide the opportunity for investment in rural area and in establishing the infrastructure support for the agricultural produces. Last but not the least, the experience of APC has established it as potential solution for rural unemployment and strengthening hill agriculture by making it more remunerative and fruitful to rural graduated youth.

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