

Strategies for Doubling Farmers Income through Agro-Processing

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Farmers' inclusive growth would require a shift from production-based agriculture to profit based farming. Small and marginal farmers, who constitute around 85 per cent of total farming population, are last to reap the benefits of agro-based enterprises; as they end up fighting distress sale and post-harvest losses. The farm harvest price i.e. average wholesale price at which the commodity is disposed off by the producer to the trader at the village site during the specified harvest period provides us a clear picture of farmers' condition. Since doubling of income will warrant high growth rate of production year after year, there would a need for robust post-production activities and hence' investment in storage and transportation' inducing cold chain logistics and food processing. It is hypothesized that with the establishment of processing centres/units,existing post-harvest losses, which occurred due to non-availability of processing and post-harvest infrastructure facilities, can be minimized upto 30 percent and farmers will also realize higher prices of their produce by 5 percent. Expected saving and/or income from this sector will be Rs. 634.94 crore per annum

India is agrarian country, however the remuneration received by farmers is not encouraging. Earlier the strategy

was to increase production so that food security can be ensured to the people of country. This strategy involved (a) an increase in productivity through better technology and varieties and increased use of quality seed, fertiliser, irrigation and agro chemicals; (b) incentive structure in the form of remunerative prices for some crops and subsidies on farm inputs; (c) public investments in and for agriculture; and (d) facilitating institutions. India's food production multiplied 3.7 times while the population multiplied by 2.55 times since independence. The net result has been a 45 per cent increase in per person food production, which

has made India not only food self-sufficient at aggregate level, but also a net food exporting country. It is true in some cases, growth in output brings similar increase in farmers' income but in many cases farmers' income did not grow much with increase in output. The net result has been that farmers' income remained low, which is evident from the incidence of poverty among farm households. Farmers' income also remained low in relation to income of those working in the non- farm sector. The low and highly fluctuating farm income is causing detrimental effect on the interest in farming and farm investments, and is also forcing more and more cultivators, particularly younger age group, to leave farming. This can cause serious adverse effect on the future of agriculture in the country. It is apparent that income earned by a farmer from agriculture is crucial to address agrarian distress (Chand 2016) and promote farmers welfare. In this background, the goal set by the Prime Minister Sh. Narendra Modi to double farmers' income by 2022-23 is central to promote farmers' welfare, reduce agrarian distress and bring parity between income of farmers and those working in non-agricultural professions. Fundamentally there are three ways in which income of farmers may be enhanced, viz., increasing the gross income, reducing the costs, and stabilizing the income. Possible routes to achieving these objectives are showcased below (fig 1) and fourth one is unconventional which ICAR-CIPHET proposes i.e. through processing and marketing of their produce.

Diversification can be a major game changer. When we talk about diversification it is mostly about high value crops. It can be of three types, viz. product (high value enterprises), process (precision farming), and time diversification

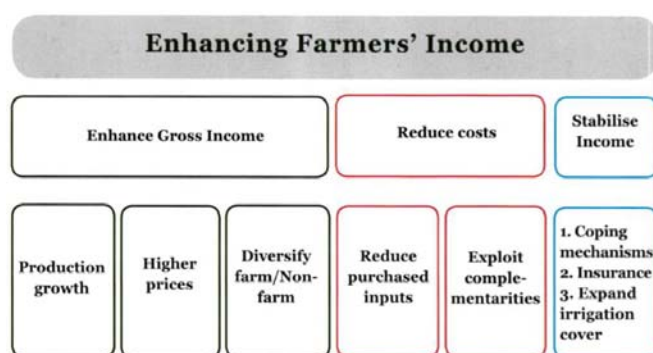


Fig. 1. Ways in which income of farmers may be enhanced

(delinking from seasonality). Bumper production of crops can lead to a sharp fall in prices. This can be prevented by changing seasonality. Not all the measures above can be implemented in all states and the pathway to doubling income will be different for each state. Under the assumption of current growth rates holding will be able to double incomes in 7 to 8 years.

Since doubling of income will warrant high growth rate of production year after year, there would a need for robust post-production activities and hence' investment in storage and transportation' inducing cold chain logistics and food processing. This will reduce post-harvest losses in high value crops such as fruits, vegetables, fish, etc. How to reduce post-harvest losses in high value crops is an important issue. Wastages in fruits, vegetables, fish, etc. need to be reduced by creating storage, cold chain, and market infrastructure. States need to be brought on board for addressing the above issues. Exercises similar to that of Madhya Pradesh, which has prepared a roadmap for doubling farmers' income, need to be taken up. The exercise should start at the block Level and then go up to the district and state level.

Enhancing Farmers income through processing and value addition of agricultural produce

Farmers' inclusive growth would require a shift from production-based agriculture to profit based farming. Small and marginal farmers, who constitute around 85 per cent of total farming population are last to reap the benefits of agro-based enterprises; as they end up fighting distress sale and post-harvest losses. The farm harvest price i.e. average wholesale price at which the commodity is disposed off by the producer to the trader at the village site during the specified harvest period provides us a clear picture of farmers' condition. The farm harvest price of major crops in Punjab, as indicated in Table 1 seems not remunerative.

Table 1. Farm Harvest Price of Major Crops in Punjab (2014-15)

Sl. No.	Crop	(Rs/Qtl)
1	Paddy	1400
2	Wheat	1410
3	Maize	1232
4	Gram	4434
5	Rapeseed and Mustard	2681
8	Sesamum	9000

(Source: Ministry of Agriculture and Farmers Welfare, 2017)

In Punjab for producing a quintal of wheat farmer has to invest Rs.1067.26 (Projected cost 2015-16, Ministry of Agriculture and Farmers Welfare) clearly shows that farmer is not getting remunerative price for their produce. Therefore, a strategy that must be adopted to double the farmers' income is value addition through processing at the production catchment itself.

What is Agro-processing

Agro processing is defined as set of techno-economic activities, applied to all the produces, originating from agricultural farm, livestock, aquacultural sources and forests for their conservation, handling and value-addition to make them usable as food, feed, fibre, fuel or industrial raw materials

Agro-processing centre (APC)

An agro-processing centre (APC) is an enterprise where the required facilities for primary and secondary processing, storage, handling and drying of cereals, pulses, oilseeds, fruits, vegetables and spices are made available on rental/ charge basis to rural people. Value added agro based products and processed food items are also prepared and marketed by the centre. This type of centre is managed by individuals/ co-operatives/ community / organizations / voluntary organization. Machines and equipment of small to medium capacity are used by these centres so that it will be easy to operate and handle. The centre meets the processing, preservation, handling and marketing needs of surplus produce available in a village or a cluster of villages. Thus, it is a means of providing income and employment to rural people through agro-processing activities of various produce. The activities of centre can be defined on the basis of available raw materials, processed products, market potential, etc. Such agro-processing centers may be established at cluster of 4-5villages or block level.

AICRP on PHET, PAU Ludhiana centre has established more than 50 APCs and as a result more APCs are coming up indicating and hence multiplier effect is clearly evident. Few examples of successful APC established under AICRP on PHET in Punjab (Table 2) shows that agripreneurs are earning a remunerative income.

Table 2. Economic benefits from APC in Punjab

APC	Lande Brar Agro Processing Complex (Moga)	Rode (Moga)	Konkekalan Grewal Flour Mill (Ludhiana)
Year of establishment	2003	2005	2006
Initial investment on machinery	5.80 lakh	6.75 lakh	6.45 lakh
Total cost (FC+VC)	6.83	14.25	21.35
Returns from processed products (Custom as well as profit basis) (in Rs. lakhs)			
Flour mill (30-35 q/day)	12.77	14.14	17.36
Mini rice mill (15 q /day)	3.37	3.54	3.38
Baby oil expeller (5 q/ day)	1.80	1.47	10.79
Masala grinder (2.75 q/day)	0.81	8.46	-
Animal feed mixer (20 q/day)	-	-	0.48
Annual Profit	11.92	13.36	10.66
Benefit cost ratio	2.75	1.93	1.50
Pay back period (years)	1.17	1.5	1.18
Break-even point (%)	54.01	59.95	54.16

Source: Nanda et. al, 2013

From above it is clear that one can earn an additional income of Rs. one lakh per month. Agro processing generates employment opportunities within sector and more opportunities in service sector. Agro processing centre (APC) in the production catchment has twin obvious advantages of enhanced income through value addition to the farm produce and reduction in post-harvest losses as a means to provide gainful rural employment. These APCs consist of two or more machines for processing at farm/village level. However, the requirement of machinery depends upon the crops to be processed, level of processing and scale of processing. Considering the specific requirements (marketable surplus and consumer demand) of Punjab state, various models have been provided.

Model-I: Agro-Processing Centre for Primary Processing of Food Grains, Oilseeds, Pulses and Spices

Table 3. Details of machines along with capacity and cost

Crop/ Commodity	Processed Products/ By-products	Components/ machines	Capacity	Total Cost (Rs.)
Paddy	Rice/Husk and bran	Mini rice mill with two polishers & elevators	250 kg/hr	1,80,000
Oilseeds	Filtered oil/Oil Cake	Baby oil expeller with filter press	60 kg/hr of oilseed	2,00,000
Wheat	Wheat Flour/Bran	Atta Chakki (with Scourer)	700 kg/hr	6,50,000
Wheat	Wheat Flour/Bran	Atta Chakki (Rajasthani)	150 kg/hr	50,000
Turmeric, Chilli	Turmeric and Chilli powder	Masala Grinder	50 kg/hr	70,000
Pulses	Graded pulses	Pulse cleaner-cum-grader	100 kg/hr	50,000
Mixture of by-products	Cattle feed	Cattle feed mill	9 qtls/hr	3,50,000
Electric motor with fitting	20-25 hp	1,50,000		
Total cost on machinery		17,00,000		

Additional Cost of packaging material approximately Rs. 150/- to Rs. 275/- per kg (depending upon the thickness) and printing charges = Rs. 0.50/package



Model-II: Mini Rice Mill, Extruded products

Sr. No.	Description	Nos	Rate	Total (Rs.)
1	Mini Rice Mill unit (with cleaner, sheller and polisher)	1	500000	500000
2	Grain cleaner/Grader	1	10000	10000
3	Extruder and its accessories	1	2500000	2500000
5	Bags and packing material		150000	150000
6	10 hp Electric motor	1	25000	25000
	Total			3185000

Model-III Agro-Processing Centre for Potato and Extruded products

Sr No.	Particulars	No	Price (Rs/Unit)	Total cost (Rs.)
1	Potato chips plant	1	1000000	1000000
2	Extruder and its accessories	1	2500000	2500000
3	Weighing balance,	1	25000	25000
4	Packaging materials			150000
5	Bagging, packing, sealing machines	1	35000	35000
6	10 hp Electric motor	2	25000	50000
	Total			3760000

Model APC-IV: Turmeric and Ginger Drying and Grinding

Sr. No.	Machinery and Equipment	Nos	Rate	Total (Rs.)
1	Working Tables	3	10000	30000
2	Work benches	3	1,000	3000
3	Stainless steel container	2	1,000	2000
4	Improved stoves/ LPG burner	3	2,000	6000
5	Washing Machine	1	30,000	30000
6	Basket Centrifuge	1	20000	20000
7	Slices	1	10,500	10500
8	Stainless steel knives	10	50	500
9	Tray dryer	2	250,000	500000
10	Pulverizer/Hammer mill	1	35000	35000
11	Packaging materials		10000	10000
12	packing, sealing machines	1	35000	35000
13	10 hp Electric motor	1	25000	25000
	Total			707000

Model APC-V: Minimal processing, Drying and powdering, Value added products.

Sr. No	Description	Nos	Rate	Rs.
1	Working Tables	3	10000	30000
2	Stainless steel container	5	500	2500
3	Improved stoves/ LPG burner	3	2000	6000
4	Washing Machine	1	35000	35000
5	Basket Centrifuge	1	20000	20000
6	Stainless steel knives	10	50	500
7	Pulp extractor	1	9500	9500
8	Wooden spoon	10	50	500
9	Rigid Plastic funnels, large bottom	10	10	100
10	Glass jars, various sizes	500	10	5000
11	Hand /electrical operated capping device (cappers)	1	5200	5200
12	Bottle brushes	10	50	500
13	Work benches	3	1000	3000
14	Multipurpose Slicer	1	55000	55000
15	Multipurpose Peeler	1	55000	55000
16	Tray dryer	1	125000	125000
17	Pulverizer/Hammer mill	1	35000	35000
18	Weighing balance, Packaging materials	1	25000	25000
19	Bagging, packing, sealing machines	1	35000	35000
20	10 hp Electric motor	1	25000	25000
21	Cold Storage facility	1	800000	800000
	Total			1272800

Model APC-VI: Sugarcane bottling plant and Jaggery Unit

Sr No.	Particulars	No	Price	Total (Rs.)
1	Sugar cane juice bottling plant (Crusher, filter, boiler, treatment unit, bottling, corking, sterilizer, crates storage etc)	1 set	500000	500000
2	Moulding frame, sieves, boiling pans, etc.			800000
3	Generator set (10 KVA)	1 set		250000
	Total			1550000

The machines are mini rice mill, baby oil expeller, small attachakkies and large attachakkies with scouring machine, masala grinder, penja, cleaner, dal mill and feed mill along with construction and installation costing approximate Rs. 25-30 lakhs and an amount of Rs 6.0-8.0 lakhs for construction of APC shed and installation of machinery (Table 12). It is expected from the state government to provide appropriate subsidy to encourage farmers to set up these units. A desired covered space of approx. 200-300 sq. yard is required for the installation of all these machines.

To motivate the youth towards agro processing, it is envisaged that at least 25% of the capital cost can be provided by govern as an assistance. If one APC of each type in each block then an amount of Rs. 50.62 crore (details given below in Table 13) is required as an incentive for the development of such agro-processing centers in the Punjab state.

Further, government initiative in the form of establishing five primary processing or collection centres and pack houses in the state will also contributes towards increasing the income of the farmers. The proposed Rs 140 crore multi-product mega food park in Ludhiana would be set up by Punjab Agro Industries on 100 acres of land at



Table 4. Estimated Government assistance for establishment of Model APC at block level in Punjab

Model APC for Punjab	Approx. Budget Required for development	Assistance from Govt.	Proposed No. block wise	Budget Required from Govt.
Model I Agro-Processing Centre for Primary Processing of Food Grains, Oilseeds, Pulses and Spices	20 Lakh	25% of actual cost@ 5.0 Lakh	150	750.0 Lakh
Model-II: Mini Rice Mill, Extruded products	30 Lakh	25% of actual cost@ 7.5 Lakh	150	1125.0 Lakh
Model-III Agro-Processing Centre for Potato and Extruded products	40 Lakh	25% of actual cost@ 10.0 Lakh	150	1500 Lakh
APC-IV: Turmeric and Ginger Drying and Grinding	15 Lakh	25% of actual cost@ 3.75 Lakh	150	562.5 Lakh
APC-V: Minimal processing, Drying and powdering, Value added products.	15 Lakh	25% of actual cost@ 3.75 Lakh	150	562.5 Lakh
APC-VI: Sugarcane bottling plant and Jaggery Unit	15 Lakh	25% of actual cost@ 3.75 Lakh	150	562.5 Lakh
Total	5062.5 Lakh			

Table 5. Expected additional income due to processing and postharvest management

Crops	Production (Thousand Metric Ton), 2014-15	Existing Losses* (%)	Value of existing losses	Expected saving/ increase in income (Rs crore)		
				Saving due to reduction of PHL @30%	Higher price realization/value addition @5%	Total
I	II	III	IV (II x III x current price)	V (V x 0.3)	VI (II x 0.05 of current price)	VII (V+VI)
Wheat	15088	3.95	595.98	840.33	106.37	358.47
Paddy	11259	3.12	351.28	491.79	78.81	226.35
Pulses	17	7.0	1.19	5.28	0.38	1.96
Oilseeds	60	4.60	2.76	7.40	0.80	3.02
Potato	2190	5.01	109.72	49.37	4.93	19.74
Kinnow	988	6.10	60.27	48.21	3.95	18.42
Guava	161	12.78	20.58	20.58	0.81	6.98
Total				438.89	196.05	634.94

* Figures are taken from the report of Jha et.al (2015)

Ladhowal. Five collection centres would be setup at village Muskabad (Samrala), Saholi (Nabha), Kangmai (Hoshiarpur), Lalgarh (Samana) and Babri (Gurdaspur). Besides, the state is going to identify five more such centres to develop world-class fruits and vegetables clusters. In this mega food park, 30-40 food processing units processing frozen fruits and vegetables, frozen French fries, milk, maize, bakery products, wheat pasta, tomato, chilies, snack foods, eggs, malt, honey, haldi etc. would be set up. It is worth mentioning that investments in food processing industries have multidimensional benefits, i.e., value addition and better price realization by the farmers, besides reducing the postharvest losses. These centres are expected to contribute through better price realization by the farmers.

Conclusions

1. It is hypothesized that with the establishment of processing centres/units, existing post-harvest losses, which occurred due to non-availability of processing and post-harvest infrastructure facilities, can be minimized upto

30 percent and farmers will also realize higher prices of their produce by 5 percent. Expected saving and/or income from this sector will be Rs. 634.94 crore per annum (Table 5). The above figure is for Punjab state only. The model may be different for different states and certainly enhance farmers income upto certain extent.

2. Small farmers needs to associate and form commodity groups/processor companies for better earning profits. Women can be given training in the area of processing and can go for value addition through mango pulp processing, guava products processing such as guava leather, guava nectar and various carbonated and fresh fruits beverages.
3. Development of integrated pack house are required for grading, sorting, packaging agricultural and horticultural produce. It will have mechanical grading and sorting line, pre-cooling chamber, cold storage, reefer van and pick up van.
4. Promoting Agro-Processing Centres (APC) at the production catchment. APC has facilities for primary and secondary processing, storage, handling and drying of cereals, pulses, oilseeds, fruits, vegetables and spices are made available on rental/ charge basis to rural people. This type of centre can be managed by individuals/ co-operatives/ community / organizations / voluntary organization. Machines and equipment of small to medium capacity are used by these centres so that it will be easy to operate and handle. The centre meets the processing, preservation, handling and marketing needs of surplus produce available in a village or a cluster of villages.
5. Skill Development Centre in horticultural crop processing and packaging. Trained manpower in the production, post-harvest & processing industries is required to cater to the demand for processed horticultural products for domestic trade and export purpose.

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