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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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APPROPRIATE TECHNOLOGY FOR THE PRODUCTION OF OILS AND FATS

APPROPRIATE TECHNOLOGY FOR PRODUCTION AND PROCESSING OF OILS AND FATS

Background Paper

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APPROPRIATE TECHNOLOGY FOR PRODUCTION AND PROCESSING OF OILS AND FATS

by

K. T. Achaya

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ABSTRACT

In practice, the country's needs of vegetable oil can be met through decentralised rural ghani units, backed up with solvent-extraction units for recovery of the oil left in the cake. Expeller technology represents an intermediate stage with less employment-generating potential. Grouping village crushing units into cooperatives will enable the latter to keep oil prices under control. Such cooperatives could also build up facilities for refining oils and preparing oil-based products, and for marketing these commodities. There appears to be scope for marketing unit-packed unrefined oils, and for exploring the use of vending machines for dispensing liquid oils and thus saving on packaging costs.

Production of Oil

Mustard and sesame oils seem to have been used in India from very early times. The oils and fats industry in the country is one example of a traditional technology which served the needs of the people for thousands of years. Since the turn of the century, older methods have been supplemented by modern technologies of various levels of sophistication. In consequence, the picture now is a complex one. Tiny traditional ghanis for oil-extraction involving animal power exist alongside power-driven ghanis of improved design. Since about 1930 power-expellers of various degrees have been set up, followed later by solvent-extraction units of high efficiency. Table 1 shows various estimates of the numbers of each from which it appears that the country has between 2 and 3 lakhs of village ghanis, about

50,000 power-driven ghanis of the improved Wardha type, about 15,000 non-power oil expellers and 500-600 powered expellers, and nearly 200 solvent-extraction units. In terms of oil production, the village ghanis and the non-power expellers each appear to contribute about 35 percent and the power expellers about 20 percent. The remaining 10 percent derives from improved ghanis and solvent-extraction units. Thus production of vegetable oil, at any rate, is largely a small decentralised industry.

Table 2 shows the structure and efficiency of units of various types registered under the Factories Act. Though far from being total, the figures illustrate the characteristics of units of each type. Broadly, the tiny units would represent village ghanis, the small scale (with a capital outlay between Rs 1 and Rs 10 lakhs) would be mostly powered expellers, and the large-scale would represent mostly solvent extraction units. These figures can probably be extrapolated to total levels in certain respects.

It is interesting to find that the ratio of capital to output was as low as 0.41 for the tiny units, while standing at 1.25 for the large-scale units. Thus not only are the capital needs for small units small in themselves, but this capital is used in terms of production about three times as efficiently in these tiny units as in the large establishments.

The employment-creating potential of the small units cannot however be considered very high. Each employs about 20 persons on an average, whereas the large units employ 132 persons each. The medium units, representing mostly powered oil expellers, average 40 persons employed, but still show a good capital to output ratio of 0.57.

Supply of Raw Materials [a]

The tiny village ghanis, lacking ready capital, depend for their supply of seed on the village traders, who are also usually the

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[a] See P S George, U K Srivastava and B R Desai, "The Oilseeds Economy of India", Macmillan, India, 1979, p.35

village money lenders. Generally the farmers actually sell to commission agents or kuccha adatiyas, who in turn supply the village traders. Thus the farmers often get a poor deal in these local transactions.

The expelling units generally buy their oilseeds from the terminal markets, not usually directly but through the larger commission agents or pucca adatiyas (who work closely together). Nearly every season, when the prices of oil begin to fall rapidly, the farmer is forced into distress sales. The larger processors are thus able to corner the seed; since they have the economic capacity to withhold production, they send up prices, manipulate their raw material costs and show low taxable profits. The growth of regulated markets in the terminal market centres has benefited the farmers in that they now have a better knowledge of price trends (which are regularly displayed) and can thus set their own selling prices after allowing realistically for costs of transport, commission and so on.

The solvent-extraction industry uses cakes as raw material, either those of their own production or those derived from outside expeller units. Being sophisticated industries, they are able to set prices on the basis of analytical data such as oil and protein content, and on likely returns for produce.

Utilisation of Oils

Of the 32 lakh tonnes of oils produced in 1975-76 in the country, a little over 5 lakh tonnes are non-edible oils which enter the soap, paint and miscellaneous industries. Of the remaining 27 lakhs tonnes, some 6 lakh tonnes are directed towards vanaspati manufacture and one lakh tonnes for export, leaving a little over 20 lakh tonnes for edible household use.

Oils are consumed in two ways: as unrefined oil, which again is sold loose, and as refined oil, sometimes loose but generally packed in tins under various brand names. Generally ghani-derived oil is marketed locally or in nearby towns and cities in unrefined form. Expeller oil is probably mostly refined, as is all solvent-extracted

oil. On the basis of returns from factories making edible oil products, and on the more accurate production data for both hydrogenated fat and refined oils from vanaspati factories, it would seem that about 40 percent of all edible oil in India is consumed in unrefined or crude form, and about 60 percent as the refined product. Thus 8 lakh tonnes of oil is probably used unrefined and 12 lakh tonnes is consumed in refined form. Another 6 lakh tonnes is consumed as vanaspati.

The possibilities of alternative technologies and their implications may now be considered.

Ghani Technology

Inefficiency or poor recovery, and low product quality, is the usual charge brought against traditional technologies. In the context of the vegetable oil industry, this need not be a drawback today, since solvent extraction of ghani oilcake will extract all the oil that remains (13-14%). Improving the efficiency of the ghani, which has attracted considerable attention (the "wardha" ghani, for example) will of course bring better returns in terms of oil recovered to the village entrepreneurs. If this oil is left in the cake, the benefit would accrue to the solvent extractor. Power oil expellers, an intermediate level of technology, could be justified in terms of higher oil yields [illegible] the advent of solvent extraction, the position [illegible] clear justification.

Employment generation through village oil industry may be considered next. From Table 2, each tiny unit registered under the Factories Act is stated to employ 20 persons on an average (this does appear rather high). The ghanis in operation in 1956 appear to have numbered 2.5 to 3 lakhs, and assuming some decline in numbers, a figure of 2 lakh ghanis today may not be far from the mark. This would imply employment of 40 lakh people. About one-third the oil produced today is from this source. If all the oil utilised in the country were to be produced by ghanies (this is of course not technically possible), the total employment generated would be 120 lakh persons. If all this oil were to be produced in the large sector

(solvent-extraction), 1500 units will be required; the employment generated would only be about 2 lakh persons. A combination of expanded ghani facilities backed up with solvent extraction would yield all the oil with maximum employment spread.

In terms of capital utilisation, ghani technology, as has been pointed out, is three times as effective as is large technology.

Power-Expeller Technology

Traditional oilseeds like groundnut, rape/mustard, sesame, coconut, linseed, castor, safflower and niger all carry sufficiently high contents of oil to enable recovery of two-thirds to three-quarters of this oil by ghani technology. Newer oil sources, like the cotton-seed, are lower in oil content (below 30 percent after dehulling) and expellers which work at much higher pressures than ghanis are required to obtain a fair yield of oil. Yet other new oil sources, such as the soya, rice bran and oilcakes, need solvent extraction to glean the oil present. Expellers were adopted at a certain stage of development in the country since they were more efficient in yielding oil than ghanis, had higher throughputs, showed a good output ratio on capital, and yielded fair employment levels. Where a conscious rural dispersal of low-capital industry is being sought, they would be less attractive than a combination of ghani extrac-tion reinforced with solvent extraction.

Other Parameters to Dispersal of Oil Industry

Effective marketing is the chief drawback of small industry, which in consequence has been forced to feed markets within easy reach of foot or bicycle. This limitation can be overcome if groups of small oil manufacturers were to feed their raw oil produce to a common pool which is large enough and financially strong enough to afford the costs of good packing and wide marketing, distribution and publicity. The other advantage will be that, while small units

have so far been constrained to market only raw oils, group marketing will enable common facilities for oil storage and processing to be set up; this will extend the range of products. Refined oils, hydrogenated fats, margarines and bakery ' ts could all be manufactured with capital borrowed from banks or generated from sales. The major advantage will be that the small producers will not be at the financial mercy of traders and big buyers who have the storage facilities to be able to dictate prices. Such strength will eventually be to the benefit of consumers, who today have to pay the price laid down by speculators and profiteers.

Such grouping can best be achieved through the formation of cooperatives, run and managed by the ghani producers themselves. The example of the dairy industry, which is run almost totally on the cooperative pattern, is eminently worthy of emulation. The cooperative groupings that will befeasible will have to be worked out after determining the geographical distribution of the present oil mills. As things are, 2 villages in every 5 appear to have an oil-ghani, so such cooperative bunching should certainly be feasible.

Certain Marketing Aspects

While refined oils are often (though not always) marketed in containers, raw oils amounting to 8 lakh tonnes are always marketed loose. Use of raw oils is a traditional practice, and consumer demand has depended on the flavours characteristic of various fresh oils. Such preferences are strongly regional. Well-known examples are the insistence on raw rape/mustard oil in Bengal, and on raw coconut oil in Kerala. Unrefined oils in suitable packs are therefore sure to have considerable demand, besides the fact that oils sold loose are frequently adulterated, and brand-name packed products would carry much greater assurance of quality.

Refining yields oils which are bland, colourless and odourless. Refining therefore does result in equating various oils, and the choice for the consumer then shifts from flavour to other desired characteristics such as appearance, frying behaviour, stability, unsaturation or health-promotion. The cost of refining

cannot be justified in nutritional terms; primarily it rests on cleanliness and blandness of the product, and therefore on flexibility in usage.

A serious constraint today is the cost of packaging in tins. There is a good case for dispensing oils, whether raw or refined, through vending machines (like petrol pumps) actuated by a token in amounts of 0.5, 1 or 2 kg into the customer's own container. The success of milk vending in this way is pertinent. Oil vending would be less expensive than milk dispensing since refrigeration of the units would not be required.

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Table 1. Units producing vegetable oils in India

		Number	Capacity, utilisation, etc	
I. Report of RRL Hyderabad [1]				
Village ghanis [a]		2,30,000	Total crushing capacity	243 lt
			Actual oilseed available	112 lt
Oil expeller units [a]		13,600	Utilisation of capacity	40 %
Oil expeller units [b]		15,339	Installed capacity	141 lt
Solvent extraction units [b]		187	Installed capacity	38 lt
			Utilisation of capacity	20-30%
II. Wealth of India entry [2]				
Village ghanis	1956	3,09,000	—	
Registered traditional ghanis	1962	21,870	—	
Improved Wardha ghanis	1971	41,950	Production 43,000 t of oil	
Oil expeller units	1964	350	Production 3.71 lt	
	1966	-	Production 16.00 lt	
Solvent extraction unit	1974	187	Installed capacity	38 lt of cake
			Production	1 lt of oil

[1] Regional Research Laboratory, Hyderabad, "Study on Oilseeds Sector: Processing and Utilisation of Oilseeds and Products", May 1976

(a) p.8-9, quoted from an estimate by the Department of Economics, University of Bombay

(b) Tables 2.5.T7 and 2.5.T5

[2] "Vegetable Oils", The Wealth of India: Industrial Products, Vol. IX, Council of Scientific and Industrial Research, New Delhi, 1976

Table 2. Structure of vegetable oil producing units in India in 1974/75 [1,2]

	Sector [3,4]			
	Tiny	Small scale	Large scale	Total
	(Figures in brackets are percentages of each total)			
Units, number	1603 (66.6)	605 (25.1)	55 (2.3)	2,408
Employees, number	31,349 (48.8)	23,714 (36.9)	7,242 (11.3)	64,273
Gross output, Rs, lakhs	34,680 (36.2)	42,419 (44.3)	15,907 (16.6)	95,768
Capital-output ratio	0.41	0.57	1.25	0.60

[1] Bimal Jalan, "Production in tiny, small and large-scale sectors", Economic and Political Weekly, May 20, 1978, p.853

[2] Data disaggregated from Annual Survey of Industries for 1975/76, Office of the Economic Adviser, Ministry of Industry, New Delhi

[3] Includes only all factories registered under the Factories Act

[4] Fixed capital (land, building, plant, machinery at book value):

Upto Rs 1 lakh = Tiny sector
upto Rs 10 lakhs = Small-scale sector
Beyond Rs 10 lakhs = Large-scale sector

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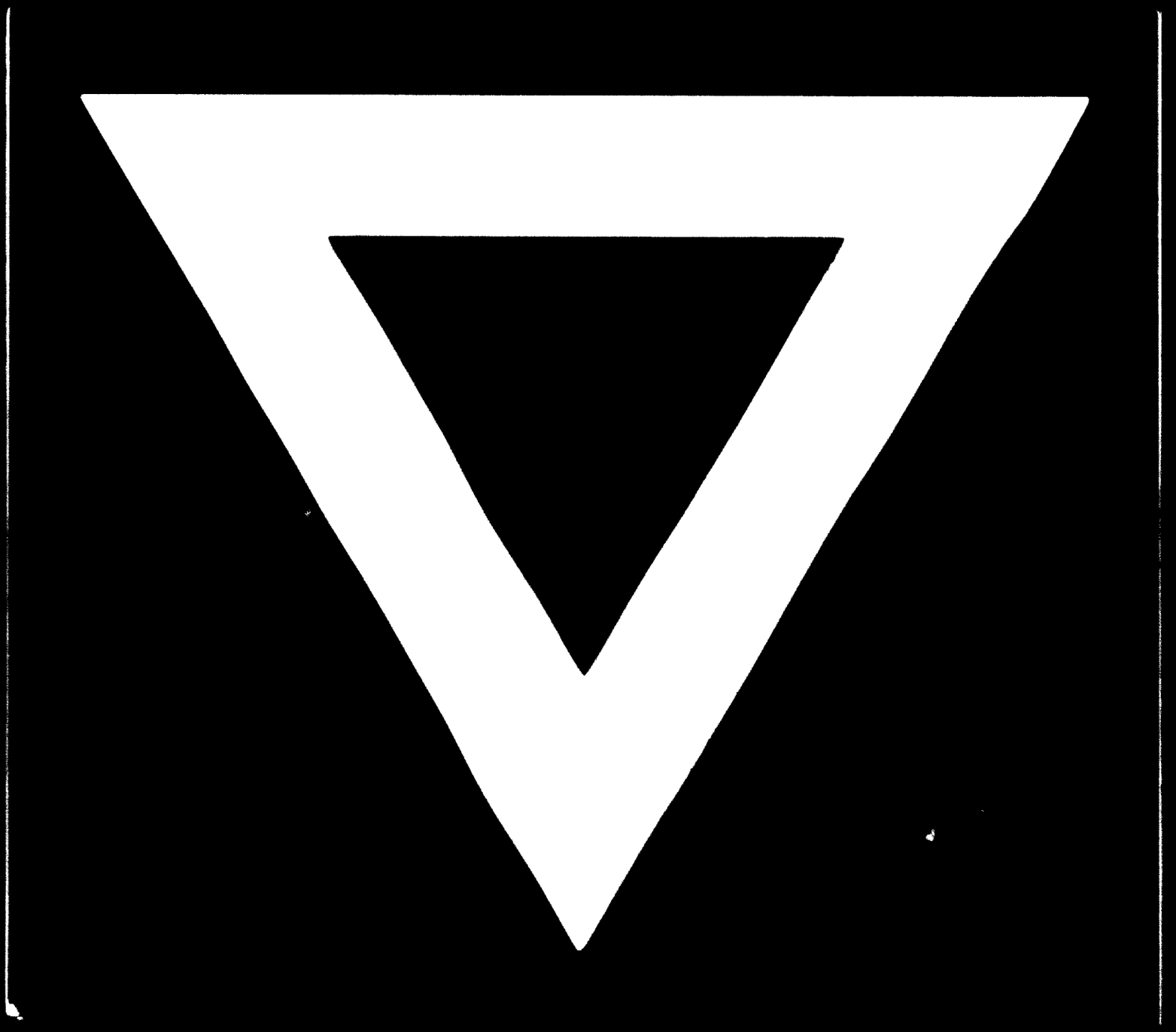

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