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Vol XXI  
No. 4

ISSN 0019-5014

CONFERENCE  
NUMBER

OCTOBER-  
DECEMBER  
1966

# INDIAN JOURNAL OF AGRICULTURAL ECONOMICS



INDIAN SOCIETY OF  
AGRICULTURAL ECONOMICS,  
BOMBAY

## RAPPORTEUR'S REPORT

ON

### LOCATION AND ROLE OF AGRICULTURAL PROCESSING AND SUPPLY INDUSTRIES

RAPPORTEUR : N. A. MUJUMDAR

*Deputy Director  
Economic Department  
Reserve Bank of India, Bombay*

#### *Introduction*

A total number of 15 papers have been submitted on the subject. Since certain areas of the subject do not seem to have been traversed by the papers it would be useful, at the outset, to spell out the scope of the subject. Against the background of the scope thus envisaged, a brief review of the material presented in the papers is undertaken in the second section. In the light of this review the main issues that emerge and issues on which discussion could be usefully focussed are indicated in the third and concluding section.

#### I. THE SCOPE OF THE SUBJECT

Earlier, for the benefit of the paper-writers, the scope of the subject was outlined in the following words :

##### (i) *Processing Industries*

The role of processing industries may be looked at from the viewpoint of agricultural development. In this context, it may be rewarding to identify and assess, what may be called, the feed-back effects of the establishment of processing industries on the productivity of land producing the primary product, or more generally, on the business of farming in the area or region concerned. The impact on product prices and factor markets also becomes relevant in this context. This aspect may be studied with reference to certain processing industries or regions. Further, the rationale underlying the plea for co-operativization of some processing industries may be examined together with its implications for promoting co-operative marketing and credit. It is desirable that papers dealing with this aspect attempt to provide either through field investigation or through analysis of available data, more concrete indicators of the impact of processing industries or of the implications of their co-operativization.

The present levels of efficiency, both technical and economic, of certain processing industries may be appraised and the scope for increasing efficiency through modernization, utilization of by-products, etc., may be explored. The implications of modernization for traditional industries may also be brought out. Another aspect which needs to be studied is the operational feasibility of using certain processing units as instruments for regulating distributive trade in their end-products.

Is a certain geographical dispersion inherent in the location of processing industries ? The relative importance of the various factors in determining the location of processing industries/units may be assessed. In respect of future location the extent to which delimitation of areas for specific crops may assist in bringing about a more rational location of processing industries may be examined. Against this broader background, papers may discuss the problem of location of processing industries/units with specific reference to crops/regions/industries.

## (ii) *Supply Industries*

The supply industries may be described as those industries which produce inputs for agriculture. It may be useful to adopt some classification of such inputs to clarify their different use or nature such as, for instance, competitive and non-competitive inputs in relation to their use in the agricultural and the non-agricultural sectors, current and fixed inputs corresponding to working capital and investment expenditure. The correlation between farm technology and use-levels of these material inputs may be explored. Here the attempt should be to identify and assess the relative importance of these different inputs associated with higher rates of agricultural growth. Papers may deal with empirical research relating to agricultural growth in other countries or with the contemporary experience of different regions in India.

In respect of location, perhaps the usual criteria applicable to other industries like availability of raw material, unit-cost minimization, etc., may determine the location. The important point to be considered, however, is : how far would the fact that the consumers—farming units—are spread over the entire country affect the choice of location of these industries ? Since the transport costs for distribution of products are likely to be considerable, in deciding the location it may be perhaps more appropriate to take into account the average delivered costs to the consumer rather than the ex-work production costs. This aspect may be examined with reference to specific inputs like fertilizers and pesticides.

## II. REVIEW OF PAPERS

When the material presented in the papers is judged from the standpoint of the scope set out above, one lacuna becomes immediately conspicuous. While all the 15 papers deal with processing industries, only one paper deals only partly, with supply industries. This point has to be borne in mind while framing issues for discussion.

The material on processing industries could be conveniently discussed under five broad headings : concepts and definitions, factors determining location, impact on agricultural development, integration of processing and marketing and operational efficiency.

### (i) *Concepts and Definitions*

Some contributors have taken up the basic question of precise identification of the category of agricultural processing industries by putting forth definitions of the concept of processing. Processing has been defined as "the process of changing raw materials into finished products" (Sudhakar Gautam and B.D.

Shukla and R. K. Pandey). Another definition of processing as "the conversion of farm products into more usable form" (A.S. Kahlon and M. V. George) does not seem to impart any further clarity to the concept. Usha Dar raises a more fundamental question, namely, the definition of the two words "agricultural" and 'processing.' She proffers two suggestions. Firstly, the coverage of agricultural processing industries should be enlarged by accepting a wider connotation of the agricultural sector itself, by including within its fold allied occupations like "horticulture, plantations, forests and animal husbandry." Secondly, processing should be regarded as legitimately agricultural processing only upto a stage "when chemical changes are introduced in the finished product." It may be noted that in the classification adopted for purposes of National Income Estimates, the agricultural sector includes (i) agriculture, animal husbandry and ancillary activities, (ii) forestry and (iii) fishery. While therefore it should not be difficult to accept some such definition of the agricultural sector for the present purpose, Usha Dar's definition of "agricultural processing" remains admittedly abstruse.

Notwithstanding the conceptual haziness manifest in such attempts at neat and clear-cut definitions, the contributors seem to be fairly clear in their mind in regard to what they mean by agricultural processing industries; this is evident in the different descriptive accounts. For instance, Sudhakar Gautam points out : "There are many farm products such as milk, eggs, fruits and vegetables which may be consumed in the form in which they leave the farm. But most of the products of the farm are subject to processing before they reach the consumer. Processing is not only essential to convert the product into a consumable form, but it is also essential to preserve the perishable as well as non-perishable products."

## (ii) *Factors Determining Location*

In an effort to unravel the factors that determine or influence location, a wide range of agricultural processing industries have been examined in considerable details : sugar factories in Maharashtra, Mysore and Orissa; groundnut processing industries in Gujarat and Maharashtra; foodgrains processing industries in the Punjab, Madhya Pradesh and in the country as a whole; fruits preservation and processing in the Punjab and Maharashtra; cotton ginning and pressing and mustard and rape seed processing both in the Punjab. Obviously, it is not possible to summarize these descriptive accounts here. Perhaps it would suffice to refer to some aspects of these interesting papers in so far as they highlight the importance of particular factors in determining the location of a processing industry.

One could usefully begin the discussion on factors influencing location with a very interesting paper by M. T. R. Sarma who has examined the location patterns of rice mills, wheat flour mills and *dal* mills. His investigations appear to provide an affirmative answer to the question posed earlier : Is a certain geographical dispersion inherent in the location of processing industries ? Further, he shows that the location pattern is related to the geographical pattern of production of the relevant crops. On the basis of his findings, he lists the following three factors as being particularly important in the determination of location of foodgrains processing industry : (a) availability of "raw material" to be processed, (b) cost of labour and (c) cost of fuels and power. While this is the overall conclusion of the paper, a subtle distinction between the location pattern of rice

mills and wheat flour mills has also been sought to be underlined. While in the former case location is determined by the availability of raw material, namely, paddy, in the latter case market considerations, rather than availability of raw material, have influenced the location pattern. He therefore concludes that while the location of the former is raw material-oriented, that of the latter is market-oriented. In this context, it is pertinent to ask whether the persistent imports of wheat<sup>1</sup> on a sizable scale have, to a considerable extent, influenced the location pattern of wheat flour mills. If they have, it may be necessary to refine the analysis further by introducing this exogenous factor and also its concomitant, namely, transportation or proximity to ports, etc.

In examining the location pattern, Sarma has adopted the State as a region. But a Statewise analysis, although convenient for several reasons, may not tell the whole story of location, at any rate in respect of certain processing industries. This point has been ably demonstrated by P. P. Madappa who has examined the location pattern of groundnut solvent extraction industry. At the aggregate level, location of this industry appears to be raw material-oriented in the sense that the industry is concentrated in those States which account for the bulk of oilseeds production, or groundnut production in particular. Carrying forward this analysis to location of extraction units within the State of Gujarat, Madappa shows that within the States location is determined by the "export-oriented" nature of the industry rather than by availability of raw material. The concentration of extraction units in the Saurashtra region is attributable to the availability of all-weather ports and not so much to groundnut production. Here is therefore a case of export-orientation determining the location pattern of a processing industry.

The Saurashtra case need not, however, lead one to believe that this export-orientation is necessarily reflected in the location pattern of the solvent extraction industry throughout the country; this becomes clear in another study of the groundnut processing complex at Sangli in Maharashtra. M. G. Chandrachud's paper brings out the implications of an internally integrated processing structure such as the one that has emerged in the co-operative sector at Sangli. The groundnut solvent extraction plant with a capacity of processing about 15,000 tons of expeller oil cake and yielding 14,000 of de-oil cake and 1,100 tons of oil is necessarily dependent, for its raw material, namely, expeller oil cake, on the 30 feeder oil mills established simultaneously in the Sangli district. That the inter-connectedness of the extraction plant and the oil mills is not merely one of physical propinquity but also one of *size* is evident from the fact that the 30 oil mills have an estimated capacity of processing about 3.6 lakh tons of groundnut and yielding about 1.08 lakh tons of oil and about 16,000 tons of oil cake—the quantum of oil cake being directly correlated to the capacity of the extraction plant. Apart from the "raw material-orientedness" which is writ large on the whole processing complex—groundnut production facilitating establishment of oil mills, which in turn, lead to the emergence of extraction plant—the importance of Chandrachud's paper lies in the fact that it brings out the inter-dependence of the *size* of processing plants at various stages.

1. For instance, imports of wheat averaged around 2.52 million tonnes annually during the six years 1955-60, as compared to the average of the marketed surplus of 3.02 million tonnes from domestic production.

The perishable nature of the farm product may itself act as a powerful stimulant for the location of a processing plant. This is illustrated in the paper by M.M. Bhalerao on the banana powder plant in the Jalgaon district of Maharashtra. The district produces about 6 lakh tons of banana of which hardly 2 per cent is consumed locally, the rest being exported to other States as well as to foreign countries. The point is that both the bunching of supplies during a particular period as well as the consequent transport bottlenecks necessarily condition the growth of the banana plantations, unless the produce is processed locally with a view to exporting the end-product, namely, banana powder.

Given two alternative choices for the location of a processing industry, what are the criteria on the basis of which it would be possible to prefer the one to the other? A. C. Sharma and A. S. Kahlon address themselves to a similar question when examining the location of cotton ginning and pressing industry in the Ludhiana district of the Punjab. Discussing the relative appropriateness of the two markets Jagraon and Mullanpur, in both of which cotton ginning and pressing factories are at present concentrated, the authors try to argue that the location in the former is preferable in view of the following factors: availability of raw material, efficient marketing and transport facilities and banking facilities providing working capital. The pointedness of their analysis, however, gets somewhat blunted in the concluding paragraph where a decline of the industry is predicted even in the Jagraon market.

S. S. Johl and M. S. Mudahar have attempted to assess the scope for locating additional processing units in certain districts of the Punjab in respect of several processing industries. Such an assessment is based generally on a simple method of (i) estimating the raw material available for processing and (ii) the existing capacity for processing. The difference between the two is deemed to indicate the extent of the scope for future expansion.

Thus an examination of a cross-section of agricultural processing industries has thrown up a number of factors which have, taken singly or in different combinations, influenced location; these factors are: availability of "raw material," costs of transport and power, export-orientedness of the processed product, perishable nature of the produce to be processed, costs of labour and institutional credit facilities.

### (iii) *Impact on Agriculture*

Processing industries are expected, at any rate on *a priori* grounds, to play an important role in promoting agricultural development in those areas from which the raw material is drawn. Viewed from this angle, an assessment of the feed-back effects of processing industries on the business of farming in the "hinterland" forms a part, a very important part, of the assessment of the role of processing industries. Some contributors have made an attempt to identify and wherever possible assess such feed-back effects with reference to specific processing industries. A brief mention of these attempts may now be made.

Three papers concern themselves with the sugar industry in Maharashtra (M. G. Chandrachud), Mysore (S. M. Khot and G. V. Kamala) and Orissa (Bidyadhar Misra and A. K. Mitra). The impact of the establishment of sugar industry on



the agricultural economy in the concerned regions has been sought to be assessed through mainly three indicators. First, there takes place a shift of land resources from the low value yielding crops to the high value yielding crop, namely, sugarcane; this is evident in the expansion of acreage under sugarcane referred to in all the three papers. Second, land productivity or yield per acre increases. Maharashtra seems to provide a remarkable instance in this respect; the per acre yield of cane in the areas commanded by the co-operative sugar factories is 36 tons as against the all-India average of 15 tons. Thirdly, the quality of the cane also improves as is reflected in the recovery percentage of 11.25 in Maharashtra as against the all-India average of 10.

While this aspect of agricultural growth, stemming as it does directly from the establishment of the sugar industry, has been called a primary impact, reference has also been made by one paper to what have been called secondary effects. In Mandya (Mysore) the sugar factory has given rise to the emergence of several other industries based on the use of the by-products of the sugar industry : a distillery which, using molasses, manufactures rectified spirit and alcohol, a paper mill which uses bagasse, manufacture of acetic acid, etc. Further, the fact that the improvement in transport facilities has rendered possible the growing of a second crop of vegetables in the areas surrounding the sugar factories in Orissa could also be considered as one of such indirect effects.

One can also allude to another effect which is implicit in the descriptive accounts furnished by the contributors. The establishment of sugar factories has facilitated investment in social and economic overheads like roads, schools, hospitals, etc. Such investment on infra-structure is bound to reflect itself, at any rate, in the long run, in higher labour productivity.

The switching-over of land resources to high value yielding crops has also been brought out in another paper relating to groundnut solvent extraction industry in Gujarat (Madappa). Here a direct relationship has been sought to be established between the growth of the solvent extraction industry on the one hand and expansion of groundnut acreage on the other. Incidentally, it should be pointed out that, apart from the statistical significance of the relationship claimed by the author, from the methodological point of view, perhaps the more meaningful relationships are : first, between the growth of groundnut extraction industry and groundnut prices and second, between groundnut prices and acreage under groundnut. The point is that the impact of the extraction industry could be transmitted back to the farmer only through the prices of groundnut. Then again, in certain cases to obtain a comprehensive picture it may also be necessary to consider the trends in relative prices of groundnut and its substitutable crops. These points are mentioned here in passing only with a view to underlining the need in some cases to account for other factors in any efforts at ascribing expansions of acreage wholly to processing industries.

Processing industries are able to generate these salutary effects on agriculture because, as Dineshwar Prasad points out, they provide "a stable level of prices and assured market for farm products." While the latter holds true perhaps for all processing industries examined in these papers, the former seems to hold true only for the sugar industry. Further, from the descriptive accounts it becomes clear



that a more active extension service operated by the sugar industry has played an important role in raising land productivity.

(iv) *Integration of Processing and Marketing*

A second facet of the role that the processing industry is expected to play pertains to the possibility of bringing about an integration between marketing and processing functions. As noted earlier, such integration has already been built into the Co-operative Sugar Factories which not only provide an assured market for cane but also a guaranteed minimum price. The fact that an attempt to transplant such an arrangement to groundnut processing industry in Sangli in Maharashtra proved rather abortive is discussed in considerable details in a paper by Chandrachud. The question involved here is the traditional marketing problem: since the cultivator disposes of the groundnut crop immediately during the post-harvest season, when prices are generally at their lowest ebb, he is unable to reap the benefits of the subsequent rise in prices of groundnut and/or groundnut oil. To obviate this difficulty the co-operative oil mills in the Sangli district undertook to purchase the entire produce from the cultivator and make an advance payment of the order of 80 per cent of the value of produce at "an average rate" worked out on the basis of the prices prevailing during the previous two years, the balance was to be paid at the end of the year taking into account the profits realized on sale of oil and oil cake. However, as market prices during the period 1963-64 to 1965-66 were much higher than "the average prices" offered by the oil mills, the latter failed to attract the produce and as a consequence were forced to work much below their capacity. This experience provides a case of unrealistic prices offered by a processing unit frustrating the efforts to command the continued loyalty of the cultivator-members.

What is the nature of the existing link between the producer on the one hand and traders, marketing co-operatives and processing units on the other? This question has been sought to be answered by Kahlon and George through an investigation into five markets in the Punjab. Their investigation reveals that processing units are linked to producers only through commission agents, direct purchases from farmers accounting for hardly 10 per cent of the total. The only visible link was the extension of credit to commission agents, who in turn advanced production loans to farmers. Another interesting finding about the integration of marketing and processing is the case of starch manufacturing firms which provide inputs like fertilizers and improved seeds to the producers on the condition that the produce should be sold to the firms.

(v) *Operational Efficiency*

The possibilities of improving the operational efficiency of processing industries forms part of the scope of the subject. Three papers have examined this aspects of the problem with reference to oil mills, rice mills and solvent extraction plants. In the case of both oil and rice mills the problem is one of employing improved technology. Shukla and Pandey demonstrate that the medium and large sized oil mills, which employ improved technology, are far more efficient than the traditional processing units (*Kolhus*), when judged from the standpoint of the oil recovered per unit of raw material. A. V. Sankarnarayanan emphasizes that the out-turn of rice from paddy could be raised from the present

level of about 62 to 68 per cent to about 72 per cent by modernizing rice mills. In the case of the groundnut solvent extraction industry, Madappa points out that efficiency could be increased by a fuller use of processing capacity. The present extent of capacity used being as low as 65 per cent, unit costs of processing are higher. Two indicators of the operational efficiency of processing industries seem to be therefore implicit in the discussion of these cases : a more efficient use of raw material to be processed and reduction in the unit costs of processing.

The discussion on these five aspects sums up the material relating to processing industries.

### *Supply Industries*

Only one paper has taken up an aspect of the supply industries for analysis. Johl and Mudahar have presented an analysis of districtwise distribution of various agricultural implements and machinery like tractors, oil engines, electric motors, sugarcane crushers, etc., in the State of Punjab. The refrain of the paper is that some implements are concentrated in certain districts whereas in others there is an "inadequacy" of supply. No attempt is made to provide the rationale, if any, for such concentration, say, by correlating the relevant implements with factors like crops, size-distribution of holdings, quantum of labour, extent of irrigation, etc.; nor is any norm furnished for judging 'adequacy' of supply.

Another point emphasized by the authors, as also by Usha Dar, is the need for facilities for servicing the implements or machinery.

## III. ISSUES FOR DISCUSSION

Although the review of papers presented in the previous section is itself designed to serve as the basis for discussion at the Conference, the purpose of this section is to specify the more important aspects of the subject on which attention could fruitfully be focussed. It seems convenient to organize the discussion separately for processing and supply industries.

### *Processing Industries*

To begin with, the question of defining precisely an agricultural processing industry may be taken up. The problem involved here is somewhat like this: At what point does an agricultural processing industry graduate into a "manufacturing" industry proper ? Tentatively one or two criteria could be put forward for consideration. If agricultural raw material accounts for a substantial proportion of the cost of production of the end-product, perhaps the industry could be categorized as agricultural processing industry. The dividing line between agricultural processing industries and "agro-based" industries could sometimes be blurred and hence it is desirable to explore whether such a criterion could serve the purpose of demarcation. Or, would it also be necessary to add a second criterion, namely, a certain sophistication in the manufacturing process ?

In regard to the role of processing industries, analytically speaking, two inducement mechanisms may be said to be operating in most of the agricultural processing industries. Firstly, the input provision, derived demand or what

could be called *backward linkage* effects; that is a processing activity will induce attempts to supply the inputs—in this case agricultural produce—needed for that activity. Secondly, the output utilization or what could be called *forward linkage* effects; that is a processing activity that does not by its nature cater exclusively to final demands will induce attempts to utilize its output—or its by-products—as inputs in new activities. The strategic importance of processing industries stems from the fact that while the former mechanism is important for agricultural growth, the latter provides the base for rural industrialization. The sugar industry discussed earlier provides a case in which both the effects seem to have manifested themselves. Development policy should aim at enlisting both the categories of forces. The role of the different agricultural processing industries could be discussed within this broad analytical framework. For instance, why is it that the inducement mechanisms appear to be more potent in the case of commercial crops than in food crops?

As a logical corollary, it also becomes essential to examine, the *modus operandi* through which the backward and forward linkage effects are generally transmitted. Basically, are the necessary economic stimuli inherent in the processing industry in the sense that once the processing industry is established, there takes place an autonomous release of the forces facilitating the transmission of these effects? Or, is there a need for inducing these forces in a more purposive and planned manner? In the case of the sugar industry, for instance, agricultural growth has been rendered possible because of a guaranteed price, an assured market, an aggressive extension agency almost nose-leading the cultivator to improved technology. A certain institutional arrangement for ploughing back part of the incremental income to investments in agriculture may also constitute an important part of the mechanism. These aspects may be explored fully.

Further, the ability of the processing industries to strengthen the functioning of agricultural credit and marketing system and the need for their integration may be discussed. In this context, the suitability or even the superiority of the co-operative form of organization in handling the whole range of activities over the other alternatives may be examined.

In regard to location, the papers have revealed that not all the cases can fit precisely into a particular mould; the relative importance of factors influencing location is bound to vary from one industry to another. One additional question needs, however, to be raised. Many of the criteria considered like “the coefficient of location,” for instance, appear to be more useful for understanding the *existing* location pattern rather than for providing guidelines for evolving a *future* location pattern. It would be rewarding if some criteria could be suggested—criteria with the help of which the broad contours of the future location pattern could be sketched. In this context, a point to be considered is: since the plan targets provide the orders of magnitudes of additional production of various agricultural commodities could not the location pattern of the relevant processing industries be built into these targets?

Next, has the average size of processing *firms* within a processing industry any relevance to the location pattern of the industry as a whole? Hypothetically, at any rate, one could perhaps say that the smaller the average size, the greater

the dispersion. It would be interesting to examine whether there is any likelihood of conflict between the claims of optimality of size of processing units on the one hand and the claims of wider dispersion on the other.

### *Supply Industries*

Since there has been practically no discussion in the papers on the supply industries, the outline of the subject provided above could be taken as a starting point for discussion. Only one or two points may now be added.

For an understanding of the role of supply industries it is desirable to have some idea of the contribution of what are called material inputs to agricultural growth. This is necessary because agricultural growth seems to depend, besides material inputs, on institutional reforms, economic incentives and measures for improvement in efficiency like research and extension. In particular such discussion is essential with reference to fertilizers which have been regarded as the "bell-wether" of improved farm technology. For instance, could fertilizer consumption be used as a good index of the level of farm technology, as some experts claim?<sup>2</sup>

Further, in respect of another supply industry, namely, tractor manufacture, the question that may be examined is the priority that could be accorded to programmes of farm mechanization in the context of the social compulsions to make maximum use of the surplus labour in agriculture.

The adequacy of the economic stimuli, implicit in the application of the various inputs, for promoting their use may be considered. If the need for promotional work is deemed justified, the appropriateness of the various alternative agencies will have to be examined. In this context, the implications of linking credit, inputs and marketing also become relevant.

In regard to location, if it is considered that location in the case of inputs like fertilizers is raw material-oriented rather than 'market-oriented,' the possibilities of reducing distribution costs may be explored.

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2. In particular, the Rapporteur has in mind the claim of Williams and Couston who show the coefficient of correlation between fertilizer consumption and grain yields in 40 countries to be as high as 0.87. See : *Changes in Agriculture in 26 Developing Nations*, U.S.D.A., 1965, p. 54.