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CONCLUSION

From this study it can be concluded that though the quantitative and qualitative impact of the seed store supply system except sugarcane is higher in comparison to the other two systems, the percentage of farmers making use of it is quite insignificant. The small farmers did not even dare to see the seed store personnel. The co-operative system too could not cover a large number of its member-farmers and besides a number of observed criticisms like delayed supply, dishonesty, false records and might is right, etc., was also found much nearer to the big farmers. The quantitative and economic impact of this system was higher than the market purchase and in the case of sugarcane production this system ranked highest because of the special attention given for this crop. Hundred per cent farmers were knowledgeable about market purchase but the impact of this system was the least mainly because of adulteration practices in fertilizers. The impact of all these systems on paddy and maize production did not vary much because in both these crops fertilizers were applied for top dressing for which the cultivators had enough time to devote.

MARKETING EFFICIENCY IN FERTILIZER—RETAILING

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Efficiency in marketing involves optimization of resource use consistent with the objective function. While the latter may vary between the sellers and buyers, the convergence of it would lead to market equilibrium the relevance of which to social welfare depends on the effectiveness of market structure. Since marketing can be defined as the performance of all such activities that direct the flow of goods and services from the producer to the consumer or user, the buyers' satisfaction can be considered as an output of marketing efforts whereas the cost of marketing is the input. Then, marketing efficiency can be defined as the maximization of this input-output ratio. Therefore, a reduction in cost for the same level of satisfaction or an increase in the satisfaction at given cost will result in improvement in efficiency.

It is argued that, "the very limited use of chemical fertilizers . . . is to be attributed mainly to economic factors that restrict the use of purchased inputs generally and to the lack of technical knowledge, responsive varieties and supporting institutions required for effective use of fertilizers."[1] The im-

1. Herman M. Southworth and Bruce F. Johnston (Eds.) : Agricultural Development and Economic Growth, Cornell University Press, Ithaca, New York, 1968., p. 205.

portant economic factors that restrict extensive use of chemical fertilizers in general and nitrogenous fertilizers in particular are the relatively high prices of fertilizers, high marketing costs and farmers' preference to a few select varieties over others which are technically not inferior in quality. Therefore, efficiency in marketing these fertilizers assumes significance in Tamil Nadu, because efficient marketing offers vast scope for production improvement by the best use of available stock. In order to improve the efficiency it is necessary to study the efficiency of the existing system of marketing so as to identify the possible lines of improvement. The present study is but a small attempt in this direction.

Hypothesis

For the study it is hypothesized that in a factor market the buyers of factors (producers of products for the production of which factors are sought) receive maximum satisfaction when they get their supply at least cost, at the right time, in the right place and in the right quality and quantity. It is interesting to note that the farmers prefer certain types of fertilizers to others even though the technicians would argue that no significant difference could be observed between different sources of nitrogen. In a positive analysis such as this no normative implication is allowed and preference of farmers is as assumed to be given. For further discussions on this point see section on policy implications. The farmers as buyers of nitrogenous fertilizers obtain maximum satisfaction if they receive nitrogenous fertilizers of the desired type of the required quantity at the right place and time. The farmers of the region grow sugarcane in large areas for purpose of *gur* production. In this context ammonium sulphate seems to have an edge over urea and other forms of fertilizers as the former influences the quality of *gur*. In the preliminary survey it was observed that the farmers are ready to go to any place to buy fertilizer of the desired type. Therefore, the distance (D) over which the fertilizer was transported was considered as a variable in deciding the efficiency in marketing.

An index (S) of the farmer's satisfaction was constructed. The percentage of actual supply received against quantity desired (S_1), the percentage of desired quality received in the total supply received (S_2) and the percentage of quantity received in time to the total quantity received (S_3) were worked out. Cent per cent of supply in each of S_1, S_2 and S_3 was equated to 10 points and the actual percentages were expressed as points and fraction of a point. The average of these points S_1, S_2 and S_3 was the index of the farmers' satisfaction 'S'. If the farmer receives full supply of the desired quantity and quality and in time the values of each of S_1, S_2 and S_3 is 10 and hence S is equal to ten. This is the maximum that can be reached. But there is a cost at which this maximum can be reached. Therefore, S was considered to be a function of cost 'C' and distance D. A linear function of the following form was fitted.

$$S = m + nC + pD$$

where, S is the farmer's satisfaction index and $S \leqslant 10$.

C = unit cost of marketing, *i.e.*, cost of providing services required to give 'S'.

D = Distance in kilometers.

m, n and p are parameters to be estimated.

In this study the cost of marketing 'C' was taken as the difference between the retail price fixed by the Government inclusive of taxes, surcharges, other incidentals and normal profit to cover service charges, risk, and others, and the actual price paid by the farmers, based on Mear's analysis of concurrent margins.[2] This cost is the sum of cost of additional services in retailing, monopoly gain and speculative gain. Whatever may be its components this is the cost to be paid by the farmers to receive in time the quality and quantity of fertilizers desired by them. Bain's four strategic variables in the market structure—degree of sellers concentration, degree of buyer concentration, degree of product differentiation and the conditions for entry of new firms—are quite pertinent in deciding this cost.[3] This cost of marketing was worked out per kilogram of nitrogen for each farmer and used in the function.

Methods and Materials

The study was taken up in Sarkarsamakulam Panchayat Union area of Coimbatore district. This area was selected in view of its distant location from the Coimbatore city and that the flow of fertilizer from the city was limited. The Panchayat Union comprises of 13 revenue villages. Of them, three villages, *viz.*, Vellamadai, Kalapatti and Kerranatham were covered by the study. Twenty-five farmers were selected at random from these villages. By personal enquiry details were gathered with the help of a pretested questionnaire. Additional information was gathered from all the fertilizer dealers, 17 of them in the area.

The study was confined to the marketing of nitrogenous fertilizers only, as the use of phosphatic and potassic fertilizers was limited and hence their marketing was not of much importance.

Results and Discussion

First, an attempt was made to estimate the aggregate demand and supply of nitrogenous fertilizers for the Sarkarsamakulam Panchayat Union area.

2. L. Mear : Rice Marketing in the Republic of Indonesia, Institute of Economics and Social Research, Djakarta, 1957.
3. J. S. Bain : Industrial Organisation, John Wiley and Sons, New York, 1959, p. 7.

The total demand for fertilizers for the entire block was estimated at the average rate of the quantity used per acre by the sample farmers for the various crops. The details of actually available supply of nitrogenous fertilizers were gathered from all the dealers in the area. The details of aggregate demand and supply of nitrogenous fertilizers for the block area during the year 1972-73 are presented in Table I.

TABLE I—AGGREGATE DEMAND AND SUPPLY OF NITROGENOUS FERTILIZERS IN TERMS OF NITROGEN IN SARKARSAMAKULAM BLOCK DURING 1972-73

Particulars	Quantity in kg.
Demand in terms of N	303,426
Supply in terms of N	355,496

It may be observed from the table that the aggregate supply exceeds the aggregate demand. This supply includes 2,08,753 kgs. of N supplied in the form of mixed fertilizers which the farmers accept with reluctance. Shortages arise as the farmers show preference to a few types of straight fertilizers such as ammonium sulphate or urea over others like calcium ammonium nitrate or ammonium phosphate. This preference to use a few varieties whatever may be their price leads to shortages in those varieties and resultant rise in price and speculation. Therefore, it was felt necessary to study the farmers' satisfaction in relation to the cost of marketing.

The linear function fitted is presented below :

$$S = 5.9432 + \underset{(0.0200)}{0.8811\ C^{**}} + \underset{(0.0131)}{0.1608\ D^{**}}$$

$n = 25$ $\qquad R^2 = 0.750$

** Significant at 1 per cent level.

The highly significant and positive relationship between S and C indicated that the farmers could increase their satisfaction only at increasing cost of marketing and a similar relationship between D and S indicated that the farmers had to travel longer distance if they wished to have higher satisfaction. In other words, better marketing services are available only at increasing cost.

Since the cost of marketing was defined as the difference between the retail price fixed by the Government and the cost paid by the farmers, lesser will be the cost if more be the efficiency. As the official retail price includes the cost of retailing and normal profit, a positive C indicated only above normal cost either due to additional services demanded by the buyers or

due to additional earning (abnormal profit) by intermediaries. When $C = 0$, $S = 6.58$, this meant that the marketing system could provide at the official price of fertilizer, 65.80 per cent satisfaction only. The maximum value of $S \neq 10$ could be realised only at $C = 3.88$. The cost (C) of Rs. 3.88 per kg. of N when compared to the average official retail price of Rs. 2.48 kg. of N worked out to 157 per cent of the latter.

But this positive relationship alone cannot decide the efficiency of marketing in fertilizers. Increasing consumer satisfaction calling for additional market services might increase the cost of marketing. In order to identify the factors contributing to higher cost (a positive C) correlation coefficients ${}^{r}S_{1\cdot C}$, ${}^{r}S_{2\cdot C}$ and ${}^{r}S_{3\cdot C}$ respectively between S_1 and S_2, S_3 with C were worked out and tested for significance. The results are presented below :

$${}^{r}S_{1.c} = +0.2555 \text{ N.S.}$$

$${}^{r}S_{2.c} = +0.5407^{**}$$

$${}^{r}S_{3.c} = +0.6830^{**}$$

N.S. Non-significant. ** Significant at 1 per cent level.

${}^{r}S_{1\cdot C}$, being not significant, indicated that getting adequate supply of N was not contributing to additional cost. ${}^{r}S_{2\cdot C}$ and ${}^{r}S_{3\cdot C}$, being significant, indicated that the farmers incurred additional costs to get the supply of preferred variety and for timely supply.

Policy Implications

The results discussed above have the following implications :

First, the marketing system is not efficient as increased satisfaction could be derived at increasing cost due to the non-availability of desired types of fertilizers in time. Second, the farmer's preference to a given type of fertilizers is not technically sound and decisions based on this preference are not rational and therefore he is not optimizing. Perhaps the case of sugarcane growers is an exception and decisions related to other crops have to be revised so that the costs could be kept at minimum. More intensive extension education strategies have to be devised to educate the farmers in using the other types of fertilizers available which have also balanced nutrients needed for the maintenance of soil fertility in the long run.

Third, the timeliness of supply has influenced the cost because the farmers have to travel to places of supply points to purchase in time their requirements or the local dealers arrange for supply from elsewhere at premium prices.

This raises from the traders' angle, the question of organizing orderly marketing of fertilizers which, apart from supply of desired fertilizers, involves optimum location of supply points and inventory strategies for efficient distribution. Optimization over time and space has become increasingly crucial for improving marketing efficiency in the distribution of fertilizers.

Finally, the strategies for increasing agricultural productivity by combining biological and chemical technologies can be productive if and only when factor markets are streamlined and made responsive to widening demand for different types of fertilizers. Greater attention than ever before must, therefore, be focussed on both research and extension efforts in order to improve the marketing efficiency in factor markets, fertilizer in this specific case. The present study indicates that the attitudes and operational strategies that exist need rationalization to step up the marketing efficiency and the suggestions presented need consideration and further research efforts.