OPTIMAL LEVEL OF INPUT USE AND REQUIREMENTS OF CREDIT

The functional analysis discussed in previous chapter provides sufficient information regarding the productivity of capital inputs used in the production process on the farm. Now, it has become possible to analyse as to whether the farmers are conscious of putting in their limited available resources in the right direction, be it from borrowings or otherwise. However, in the subsequent analysis, only borrowers' farms are examined. This was done on the assumption that in future, substantial farm holdings will be brought within the coverage of institutional agencies with regards to advances of production credit due to introduction of commercial banks in the agricultural lending operation. It has been examined that there exists maladjustment among resources in relation to their level of use. Thus, naturally the questions that crop up are: What should be the level of input use which would correspond with the optimum level of production under the existing technology? and what is the precise nature of gap that exists between the desired level and the existing level of use of different capital inputs? This chapter intends to answer these questions in order to create a homogenous thinking among the programmers and policy makers of the area.

Economic rationale of resource use:

The economic rationale of resource use can be ascertained by examining the ratio of marginal value product of important capital inputs to the factor cost and their respective regression coefficients with production credit and owned production fund. It was seen that
on the borrowers farms the MVPs of irrigation, manures and fertilizers and pesticides were higher than their factor costs. As against this, the MVP of hired human labour was lesser than its factor cost. Therefore, it is advisable to observe restraint in employment of hired human labour. The examination of regression coefficients of capital inputs with production credit indicated that it was performing a dual role on the farms; on one hand it stepped up the level of use of irrigation, manures and fertilizers resulting into increase in the farm income, the negative significant coefficient with hired human labour helped in reducing the level of hired human labour use on the other, the MVP of which was lesser than its factor cost. Thus, the production credit enabled the farms in securing optimization. It is, thus, believed that there existed a maladjustment in the use of level of resources and, therefore, optimization is possible within the resources at the disposal of the farmers.

Optimal level of input use:

The optimization of resources was done with only those capital inputs, the regression coefficients of which were significant on the level of output on the borrowers farms. As such, to identify the level of input use which will correspond with the optimal level of production, model used was as under:

Let: \[ Y = f(X_1, X_2), \text{and} \]

\[ f = ax_1^{b_1} x_2^{b_2} \]
Then the optimal level of production can be obtained where the marginal cost of input is equal to marginal return \((MC = MR)\).

Then,

\[
\frac{X_2}{X_1} = \frac{b_2 P_1}{b_1 P_2}
\]

Where,

- \(X_1\) = hired human labour in rupees,
- \(X_2\) = Cost of irrigation, manures and fertilizers,
- \(b_1\) = production elasticity of \(X_1\) input,
- \(b_2\) = production elasticity of \(X_2\) input,
- \(P_1\) = price of \(X_1\) input,
- \(P_2\) = price of \(X_2\) input.

With the help of above model, the optimization of two capital inputs, viz. hired human labour and irrigation, manures and fertilizers (combined) was tried. However, an attempt regarding pesticides, though its regression coefficients were not significant, was also made to find out an optimal level of its uses keeping in view its future importance in the High Yielding Varieties Programme.

Table IX-1 gives the existing and optimal levels of different important inputs.

<table>
<thead>
<tr>
<th>Input</th>
<th>Existing level</th>
<th>Optimal level</th>
<th>Increase/ decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hired human labour</td>
<td>999.00</td>
<td>262.00</td>
<td>-737.00</td>
</tr>
<tr>
<td>Irrigation, manures &amp;</td>
<td>1394.00</td>
<td>2131.00</td>
<td>+737.00</td>
</tr>
<tr>
<td>fertilizers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pesticides</td>
<td>8.00</td>
<td>139.00</td>
<td>+131.00</td>
</tr>
</tbody>
</table>
Table XI-1 indicates that the optimization is possible when farmers are ready to reduce the employment of hired human labour and the surplus thus obtained is diverted towards the use of irrigation, manures and fertilizers. Out of a total sum of Rs. 2393.00 devoted to employment of hired human labour, irrigation, manures and fertilizers, a sum of Rs. 262.00 should have gone to wage payment and the rest amount, i.e. Rs. 2131.00 should have been employed in irrigation, manures and fertilizers. In the next attempt, though the use of pesticides is not very common in the area, it was worked out that in addition to the above amount on irrigation, manures and fertilizers, a sum of Rs. 139.00 is also needed in the form of pesticides. It is the level where the farms would obtain an optimum level of output where the marginal cost and marginal revenue of the important inputs will be equalized.

In an earlier attempt also, the total requirements of manures and fertilizers and pesticides on the borrowers farms had been worked out (Table VII-12). There, it was observed that, on an average, Rs. 930.25 and Rs. 222.06 would be required for using the recommended levels of manures and fertilizers and pesticides respectively which together accounted for Rs. 1152.31. This estimate, however, is much lesser when it is compared to the total requirements of Rs. 2270.00 obtained for irrigation, manures and fertilizers and pesticides in the functional analysis. Obviously, the higher value of estimate in the case of functional analysis is due to the cost of irrigation which was clubbed together with manures and fertilizers due to some technical difficulty.
Further, it is seen from the table IX-1 that a reduction of Rs.737.00 is needed from hired human labour input and it should be transferred to irrigation, manures and fertilizers. As regards Rs. 131.00 in the form of pesticides, it is advisable to meet this requirement by reducing the input cost on hired bullock labour and others whose productivity is also at stake. Thus, the hypothesis developed as - there exists maladjustment among resources on the farms and it is possible to optimize production by resource adjustments - is found correct and, therefore, it is retained.

The optimization is possible only when the farmers are conscious of resorting to the advice which is a rather remote possibility. In such a situation, an effort is needed to achieve an optimal level among resources by supplying credit to them.

Requirements of production credit:

Production credit requirements have been estimated only for those capital inputs, the marginal value productivities of which are higher than their factor cost. For this purpose, two inputs, namely irrigation, manures and fertilizers (combined) and pesticides were taken. The credit requirements are the same which fall short of the amount needed to achieve an optimal level. Thus, a sum of Rs.868.00 is worked out as credit gap for each farm which includes Rs.737.00 for irrigation, manures and fertilizers and Rs.131.00 for pesticides. However, since on average Rs.454.00 was already lent to each farm in the form of production credit, thus, the total credit requirements for each farm came to Rs.1322.00 (Rs.868.00 + Rs.454.00) under the technological conditions existing in 1970-71. Thus, keeping an average
farm size of 3.40 hectares, the per hectare credit requirements came to Rs. 388.82. The total credit requirements for the district, in this way, for 1970-71 was put to the tune of about Rs. 15,10,10 thousand. The total production credit supplied during the year from two institutional agencies, viz. Government and Co-operative, amounted to Rs. 3,48,87 thousand leaving a gap of Rs. 11,61,22 thousand during 1970-71. The production credit requirements worked out to Rs. 599.35 in the earlier attempt (Table VII-12) for two inputs, viz. manures and fertilizers and pesticides are, again, much lower than the total credit estimated at Rs. 1322.00 obtained from the optimization of three input factors, viz. irrigation, manures and fertilizers and pesticides. This, however, needs a critical analysis as to how much production credit funds should be allowed to be incurred on irrigation. Moreover, it is necessary to revise the existing recommended level of fertilizer use in the context of new production strategy for High Yielding Varieties Programme. Thus, a review of demand for and supply of credit helps asserting the hypothesis—the supply of production credit is below the requirements of the farms.

To sum up, it may be said very emphatically that the uses of three crucial inputs, viz. manures and fertilizers, pesticides and irrigation fall much short of the total requirements necessary to obtain the optimal level in the existing technology. These requirements may, again, go up due to bringing more and more area under high yielding varieties. The owned production fund (O.P.F.) are not expected to meet this gap in the foreseeable future. Therefore, there is growing need to reduce the gap between the optimal level and existing level of the uses of those inputs enumerated above by enhancing their level of uses through a kick of production credit.