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other factors, namely, higher lubrication cost, higher labour cost and bigger share of fixed cost than those of electrified pumps, make the dieselised pumps costlier to operate than the electrified pumps. It may be noted here that the light diesel oil (crude oil) which is primarily used by the farmers for agricultural purposes is taxed<sup>2</sup> at various levels and hence it becomes costlier than the electrical power. There are about 1,50,000 dieselised pump sets in Gujarat, owners of which do not enjoy the fruits of electrification. As they have to operate their diesel engines for lift irrigation till electricity reaches such spots, can they be helped to reduce their cost of production through reduction in duty or taxes on light diesel oil is a question worth consideration.

Many persons feel that the difference in cost of crude oil (LDO) and electricity is artificially created by taxing the crude oil and subsidizing electricity. Some privileged farmers who were located in the villages nearer the power lines got their wells electrified earlier and obtained the advantage of cheap fuel for lift irrigation. The others who were located in the villages away from the power lines were left without any alternative but to pay heavy price for the fuel required to operate their dieselised pumps. In fact, both the types of farmers are practising the same type of agriculture and there should not be any discrimination as they deserve identical treatment from the government. How far taxation of diesel (LDO) and subsidizing electricity widens the gap between the privileged farmers and the unprivileged farmers, is worth consideration by the policy makers of the State departments/organizations, which help the farmers in enhancing agricultural production.

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### A CASE STUDY ON THE FINANCIAL FEASIBILITY OF ELECTRICALLY OPERATED DEEP TUBE-WELL IN ILLAMBAZAR DEVELOPMENT BLOCK IN WEST BENGAL

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#### INTRODUCTION

Rural electrification has opened a wide vista for agricultural development of our country. The demand for electricity in the rural areas is on the increase. Irrigation which is so essential for successful farming has become easier and perhaps cheaper with rural electrification. It is a common belief of the farmers that

2. Duty on light diesel oil is about 18 paise per litre which is about 36 per cent of the retail price of light diesel oil. Besides duty, there are local taxes also. All these taxes work up to four paise per HP hour of operation.

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our land is more thirsty than hungry. The importance of water to plant life arises due to the fact that water is not only a nutrient by itself but also a medium for absorption of other soil nutrients for plants. There is no denying the fact that irrigation, the life-blood of agriculture, plays a crucial role in bringing about a Green Revolution by making possible a rapid and increased adoption of the results of scientific innovations such as high-yielding seeds, fertilizer, plant protection measures, etc. In all probability, the success of our new agricultural strategy which envisages self-sufficiency in food as well as commercial crops by modernizing agriculture depends, to a large extent, on our achievement in irrigation front. Efforts are afoot in recent years throughout the country to install and energize a large number of shallow and deep tube-wells with a view to making the underground water available for the benefit of agriculture. The State Electricity Boards, the supplier of electricity to these tube-wells, are often complaining of heavy financial loss for subsidizing the price of electricity for agricultural purpose. Instances are not rare to show that the reluctance on the part of the State Electricity Boards to energize the tube-wells has delayed the successful implementation of the programme. The farmers, on the other hand, try to resist any attempt to increase the price of electricity. The controversy as to whether or not the price of electricity for agricultural purposes should be subsidized remains to be settled. A more important question arises before we come to the above controversial issue. Is irrigation financially feasible in a particular area? The present investigation is an attempt to find out an answer in this direction by analysing the data on costs and returns of the energized deep tube-wells situated in Illambazar Block, West Bengal. In West Bengal, the tube-wells which are operated by the government employees work for 8 hours a day on an average in most of the cases although they can be put to work for 16 to 20 hours a day. This means under-utilization of the capital. It is, therefore, pertinent to estimate and compare the benefit-cost ratios of irrigation at the existing and intensified use of the energized tube-well.

The specific objectives of this paper are : (1) to examine the impact of irrigation on the cropping pattern and income of the farmers, (2) to work out the benefit-cost ratio of an electrically operated deep tube-well with various levels of use of the deep tube-well and rates of interest, and (3) to provide an answer for the controversy about the necessity of subsidizing the price of electricity for irrigation in view of the heavy financial losses the supplier of electricity is incurring at present.

#### METHODOLOGY

For the purpose of this study, the electrically operated deep tube-well situated at village Ghurisha in Illambazar Block, West Bengal, was selected. The 17.5 horse power deep tube-well with an average discharge of 40,000 gallons of water per hour commands a net area of 96 acres. It worked only 8 hours a day in the year of study which seems insufficient in view of the demand for irrigation in the locality. Prior to the installation of the said tube-well, the farmers had little source of assured irrigation and partial or complete failure of crop was a regular feature of farming in that area. The chances of crop failure still exist in the locality except in the area irrigated by the deep tube-well. The farmers are unable to grow more than one crop a year on lands outside the area commanded by the deep tube-well for want of irrigation.

Relevant data pertaining to the year 1968-69 were collected from the area under the command of the deep tube-well as well as from a contiguous area of same size (96 acres) having no irrigation facilities. No abnormal weather condition prevailed during the year of study and hence a normal harvest was realised by the farmers from the unirrigated area. It is important to mention that more than half of the farmers of the irrigated area have part of their lands in the unirrigated area. This results in a smaller variation of management factor in the two samples (irrigated and unirrigated).

The benefit-cost ratio (B/C) was calculated by defining benefit and cost as follows:

Benefit (B) = (R—R'—A) Where R and R' represent the total gross returns<sup>1</sup> from the crop or crops grown on irrigated and unirrigated areas respectively and A is the associated cost of irrigation. Associated cost of irrigation (A) was obtained as follows :

$A^2 = T - T'$  where T and T' are the total annual costs of cultivation of crops in the irrigated and unirrigated areas respectively.

The total cost of cultivation includes all variable and fixed costs (except the cost of land) and both the actual and imputed costs.

The cost of irrigation (C) = F + V, where F denotes the total annual installation and maintenance cost.<sup>3</sup> This includes the annual amortized value of the capital investment for the installation and energization of the deep tube-well plus the annual establishment, maintenance and repair cost and V is the variable cost of irrigation (consumption of electricity per year).<sup>4</sup>

The total annual amortized value of the capital cost for installation and energization of the deep tube-well was computed by the following formula:

$$K'^5 = \sum_{j=1}^n k_j \text{ and } k_j = \frac{K_{oj} \cdot r}{1 - (1+r)^{-t}} \dots$$

where

|          |   |
|----------|---|
| $K'$     | is the total annual amortized value of capital.       |
| $k_j$    | is annual amortized value of jth item of the capital. |
| $K_{oj}$ | is cost price of jth item of the capital.             |
| $r$      | is the rate of interest on capital.                   |
| $t$      | is the expected life of jth item of capital.          |

1. In computing the gross returns, the values of the products as well as the by-products had been summed up at their market prices.

2. Detailed calculations of the associated cost and the annual capital cost including establishment and maintenance cost are shown in Appendices A and B respectively.

3. See footnote 2.

4. The total charges of electricity (V) were calculated by multiplying the annual consumption of electricity (30,851 units) by the current subsidized price of 12 paise per unit and by a price of 18 paise per unit which was considered as the highest price of electricity used for power in the area.

5. There are several items of capital expenditure which vary in their expected life. This necessitated amortization of each item separately and summation to get  $K'$ .

Three rates of interest, viz., 5 per cent, 7.5 per cent and 10 per cent were charged on capital for the entire period of expected life for calculation of the annual amortized values.  $(R-R')$  and  $(R-R')-A$  measure the gross and net increase in income consequent upon the impact of irrigation<sup>6</sup>. The formula used for calculating the benefit-cost ratio can also be used to determine the maximum price the farmers can afford to pay for electricity without bearing a financial loss. The objective criterion for financial feasibility of the deep tube-well suggests that the benefit-cost ratio must be greater than unity. That is,

$$\frac{B}{C} > 1 \text{ or } \frac{B}{F+V} > 1 \text{ or } \frac{V}{Q} < \frac{B-F}{Q} \text{ where } Q \text{ is the total quantity of}$$

electricity consumed during the year. The maximum price the beneficiaries can afford to pay for electricity can be worked out by considering the extreme case of the above criterion where benefit-cost ratio is just equal to unity. But the maximum feasible price of electricity obtained by the limiting case of the objective criterion is hardly acceptable since no remuneration is left to the farmers for their efforts to make use of irrigation and other associated inputs such as fertilizers, improved seeds, etc.

The question of subsidy for electricity price is related to the benefit-cost ratio evaluated at 18 paise per unit of electricity. A benefit-cost ratio higher than unity at this price indicates that there is no need of subsidy since irrigation will be financially feasible and at the same time the supplier of electricity can be paid a price of 18 paise per unit of power (the highest price charged for power).

#### FINDINGS

The impact of irrigation on cropping pattern and income of the farms are shown in Table I. It may be observed from the table that as many as ten different types of crops including some high-yielding varieties were grown in the commanded area against a single crop in the unirrigated area. The intensity of cropping in the irrigated area was 157 per cent as compared to 100 per cent in the unirrigated area. The gross returns of the farms were Rs. 419.81 and Rs. 1,053.22 per acre in unirrigated and irrigated areas respectively. This indicates that the per acre gross productivity in the irrigated area registered an increase of Rs. 633.41 (150 per cent) over that in the unirrigated area. The above facts bear the testimony of intensive use of land and other resources and ought to be regarded as the impact of irrigation.

The benefit-cost ratios computed at different rates of interest by using 12 paise and 18 paise as the prices of electricity and 8 and 16 working hours a day are presented in Table II. The ratios at the prevailing price of electricity for irrigation (12 paise per unit) and the present level of utilization of the tube-well (8 hours a day) were 2.96:1, 2.34:1, and, 2.12:1 respectively at 5 per cent, 7.5 per cent and 10 per cent interest rates. The corresponding values of the benefit-cost ratios evaluated at 18 paise per unit of electricity were 2.62:1, 2.12:1, and, 1.94:1 respectively. At 16 hours of use of the tube-well and a price of 12 paise the ratios were 3.74:1,

6. The additional income may well be attributed to the impact of irrigation. It should not, however, be considered as the sole contribution or productivity of irrigation input.

TABLE I—GROSS RETURNS, CROPPING PATTERN AND INTENSITY OF CROPPING IN THE IRRIGATED AND UNIRRIGATED AREA

Village : Ghurisha (West Bengal)

Year : 1968-69

Net area : 96 acres

| Crops                              | Area<br>(acres) | Production<br>per acre<br>(quintal) | Total<br>production<br>(quintal) | Price<br>(Rs.) | Total value<br>of the crop<br>(Rs.) |
|------------------------------------|-----------------|-------------------------------------|----------------------------------|----------------|-------------------------------------|
| <i>Irrigated area</i>              |                 |                                     |                                  |                |                                     |
| Aus Paddy .. .. .                  | 40              | *G 8.00<br>†S 14.00                 | G 320.00<br>S 560.00             | 64.31<br>3.50  | 20,579.20<br>1,960.00               |
| Aman Paddy .. .. .                 | 50              | G 9.62<br>S 13.50                   | G 481.00<br>S 675.00             | 64.31<br>4.00  | 30,933.11<br>2,700.00               |
| I. R. 8 (kharif) .. .. .           | 4               | G 20.00<br>S 21.75                  | G 80.00<br>S 87.00               | 64.31<br>2.00  | 5,144.80<br>174.00                  |
| Potato .. .. .                     | 1               | 35.00                               | 35.00                            | 30.00          | 1,050.00                            |
| High-yielding wheat .. .. .        | 30              | 8.00                                | 240.00                           | 75.00          | 18,000.00                           |
| Local wheat .. .. .                | 5               | 5.50                                | 27.50                            | 75.00          | 2,062.50                            |
| Summer vegetables .. .. .          | 15              | 22.00                               | 330.00                           | 40.00          | 13,200.00                           |
| Winter vegetables .. .. .          | 2               | 40.00                               | 80.00                            | 25.00          | 2,000.00                            |
| Lentil .. .. .                     | 1               | 3.50                                | 3.50                             | 55.00          | 192.00                              |
| I.R.8 (rabi) .. .. .               | 2               | G 23.40<br>S 26.00                  | G 46.80<br>S 52.00               | 64.31<br>2.00  | 3,009.71<br>104.00                  |
| Total .. .. .                      | 150             | —                                   | —                                | —              | 1,01,109.82                         |
| Intensity of cropping 157 per cent |                 |                                     |                                  |                |                                     |
| <i>Unirrigated area</i>            |                 |                                     |                                  |                |                                     |
| Aman Paddy .. .. .                 | 96              | G 6.00<br>S 8.50                    | G 576.00<br>S 816.00             | 64.31<br>4.00  | 37,042.56<br>3,264.00               |
| Total .. .. .                      | —               | —                                   | —                                | —              | 40,306.56                           |
| Intensity of cropping 100 per cent |                 |                                     |                                  |                |                                     |
| Increase in gross return per acre  |                 |                                     |                                  |                |                                     |
|                                    |                 | —                                   | —                                | —              | 663.41                              |

\* G = Grain. †S = Straw.

3.21:1, and, 3:1 at the interest rates of 5 per cent, 7.5 per cent and 10 per cent respectively; while they were 3.22:1, 2.82:1, and, 2.65:1 at 18 paise per unit of electricity. As expected, the benefit-cost ratios at both the prices of electricity (12 paise and 18 paise) were higher when the tube-well worked for 16 hours a day than those when the working period was 8 hours a day.

TABLE II—BENEFIT\*—COST RATIOS OF THE ELECTRICITY OPERATED DEEP TUBE-WELL AT VARIOUS INTEREST RATES, LEVEL OF USE AND PRICE OF ELECTRICITY

*Village : Ghurisha (West Bengal)*  
*Year : 1968-69*

| Rates of interest    | At 12 paise per unit<br>of electricity |                   | At 18 paise per unit<br>of electricity |                   |
|----------------------|--|-------------------|--|-------------------|
|                      | 8 hours<br>a day                       | 16 hours<br>a day | 8 hours<br>a day                       | 16 hours<br>a day |
| 5 per cent .. .. .   | 2.96 : 1                               | 3.74 : 1          | 2.62 : 1                               | 3.22 : 1          |
| 7.5 per cent .. .. . | 2.348 : 1                              | 3.21 : 1          | 2.12 : 1                               | 2.82 : 1          |
| 10 per cent .. .. .  | 2.12 : 1                               | 3.00 : 1          | 1.94 : 1                               | 2.65 : 1          |

\* With 8 hours of working a day the tube-well irrigated 96 acres of net cultivated area and the total and per acre benefits of irrigation were Rs. 42,972.07 and Rs. 447.62 respectively. With 16 hours of working a day, the estimated irrigated area, electricity consumption and the benefits will be double, assuming no change in the existing cropping pattern. For details of costs see Appendix B.

It may be observed from Table II that even the lowest benefit-cost ratio (1.94:1) is greater than unity. This indicates the financial feasibility of the energized deep tube-well under study even at a low use of the tube-well and highest rate of interest and price of electricity. Therefore, the study reveals that the subsidy is not necessary from the financial point of view.

In view of the existing low (subsidized) price of 12 paise, the Electricity Board is reluctant to energize the deep tube-wells and this has impeded the development of irrigation in the State. Since irrigation is financially feasible even at a price equal to the maximum price charged for electricity used for power, it is not advisable to continue the subsidy on the price of electricity which is indirectly hindering further development of irrigation. The losses which the Electricity Board is incurring at present can be avoided if no subsidy is allowed on the price of electricity.

It may be argued that a rise in the price of electricity from the existing level of 12 paise to 18 paise may decrease the consumption of electricity with the consequent reduction in the total benefit of irrigation. In this connection it may be pointed out that the existing system of payment of irrigation charges by the farmers is such that the demand for irrigation (or electricity) will not be affected by increase in the price. In the existing system, the farmers pay a fixed amount of irrigation charge to the State Agriculture Department on the basis of acreage and not on the consumption of electricity or irrigation water. It is the Department of Agriculture which pays the price of electricity to the Electricity Board on behalf of the farmers. Thus, the Agriculture Department is acting as a shield between the Electricity Board and the farmers. So long the Department of Agriculture does not make any change in the irrigation charges paid by the farmers, the demand for irrigation and hence the benefit of irrigation are not going to be affected by a rise or fall in the price of electricity paid to the Electricity Board by the Department of Agriculture. The rise in the price of electricity as suggested in this study will increase the budget expenditure of the State Department of Agriculture. This additional expenditure



TABLE III.—NET BENEFIT OF IRRIGATION AT VARIOUS LEVELS OF USE OF TUBE-WELL AND INTEREST RATES

Village : *Ghurisha (West Bengal)*  
Year : *1968-69*

| Levels of use of the tube-well | Rates of interest on capital (per cent) | Benefit of irrigation (B) (Rs.) | Annual cost of installation and maintenance (F) (Rs.) | Charges of electricity per year @ 18 paise per kW (V) (Rs.) | Total annual cost of irrigation (C) = F + V (Rs.) | Net benefit of irrigation (B—C) (Rs.) | Net benefit per unit of electricity used (Rs.) | Maximum prices of electricity in Rs. per kW with various levels of incentive margin |          |          |          |
|--------------------------------|---|---------------------------------|---|---|---|---------------------------------------|--|---|----------|----------|----------|
|                                |   |                                 |   |   |   |                                       |  | 0 paise   | 10 paise | 15 paise | 20 paise |
| 8 hours a day                  | 5.0                                     | 42,972.07                       | 10,816.60   | 5,553.18  | 16,369.78   | 26,602.29                             | 0.86   | 1.04  | 0.94     | 0.89     | 0.84     |
|                                | 7.5                                     | 42,972.07                       | 14,650.45   | 5,553.18  | 20,203.63   | 22,768.44                             | 0.73   | 0.91  | 0.81     | 0.76     | 0.71     |
|                                | 10.0                                    | 42,972.07                       | 16,517.00   | 5,553.18  | 22,070.18   | 20,901.89                             | 0.67   | 0.65  | 0.75     | 0.70     | 0.65     |
| 16 hours a day                 | 5.0                                     | 85,944.14                       | 15,538.36   | 11,106.36   | 26,644.72   | 59,299.42                             | 0.96   | 1.14  | 1.04     | 0.99     | 0.94     |
|                                | 7.5                                     | 85,944.14                       | 19,372.21   | 11,106.36   | 30,478.57   | 55,465.57                             | 0.90   | 1.08  | 0.98     | 0.93     | 0.88     |
|                                | 10.0                                    | 85,944.14                       | 21,238.76   | 11,106.36   | 32,345.12   | 53,599.02                             | 0.87   | 1.05  | 0.95     | 0.90     | 0.85     |

may be met out of the revenues which may be levied on the beneficiaries as development charges in the commanded area and which should not be based on the amount of irrigation. The authors are fully aware that payment of irrigation charges on the basis of acreage which is prevailing in the area leads to uneconomic use of water. The better system is that the charges of irrigation should be based on the volume of water (or the consumption of electricity). However, the fixed cost of irrigation (installation and energization) may be recovered by imposing an irrigation levy on the command area.

The net benefit of irrigation and the minimum prices which the farmers can afford to pay for electricity at various levels of use of the tube-wells and rates of interest are shown in Table III. The net benefit ranged from Rs. 20,902 to 26,602 at 8 hours of working of the tube-well and from Rs. 53,599 to Rs. 59,299 at 16 hours of working. It may be further seen from the table that the farmers can afford to pay as high a price as Re 1.14 per unit of electricity if the tube-well is allowed to work for 16 hours a day and the interest rate is 5 per cent. The above price will, however, leave no benefit to the farmers. In order to break the inhibition of the farmers particularly in the initial stage of the project, towards the adoption of scientific farming, a fraction of the benefit of irrigation should be left as incentive to the farmers. If 20 paise per unit of electricity were retained by the farmers as incentive for irrigation, the maximum price ranged from 65 paise to 84 paise per unit at the existing level of use of the tube-well (8 hours a day) and from 85 paise to 94 paise per unit at a working period of 16 hours a day. If higher margins are necessary (which depends on subjective value judgment) for farmers, the maximum price for those can be worked out from the table.

#### CONCLUSIONS AND SUGGESTIONS

The results of the investigation help us to arrive at the following conclusions:

1. The benefit-cost ratio even at the highest rate of interest (10 per cent) and the existing low level of use of the tube-well being greater than unity (1.94:1) indicates the financial feasibility of the deep tube-well under study.
2. The maximum price of electricity which the farmers can afford to pay is much higher than the existing (12 paise) and the suggested power price (18 paise) per unit. The present subsidy may, therefore, be withdrawn.
3. The existing subsidized price of electricity (12 paise per unit) is acting as a disincentive to the Electricity Board which is, therefore, not enthusiastic to undertake the work of energization for the development of irrigation. The price of electricity should be increased from 12 paise to 18 paise per unit so that the supplier of electricity is encouraged for extension of electrification in the area.
4. To protect the total benefit of irrigation from reduction due to rise in electricity price, the State Department of Agriculture should not increase the existing charges of irrigation. It may impose development charges on the beneficiaries to recover the increased price of electricity and the cost of installation and energization, if necessary.

5. After the farmers are used to pay the full development charges which will cover the annual fixed cost of irrigation, the system of irrigation charge on the basis of quantity of electricity (or water) consumed should be introduced.

6. Realisation of the fixed cost of irrigation from the beneficiaries may be advisable to reduce the disparity in the incomes of the farmers of the irrigated and the unirrigated area.

7. At present, the average working period of the deep tube-well under investigation is 8 hours a day. The commanded area is, therefore, much smaller. In view of the increasing demand for water from the farmers of the area, it is suggested that the working period be increased from 8 to 16 hours a day.

## APPENDIX A

## CALCULATION OF ASSOCIATED COST OF IRRIGATION

Village : *Ghurisha (West Bengal)*  
Year : 1968-69

| Crop  | Area<br>(acres) | Total cost of<br>cultivation per<br>acre* (Rs.) | Total cost of<br>cultivation of<br>the crop (Rs.) |
|---|-----------------|---|---|
| <i>Irrigated area</i>   |                 |   |   |
| 1. <i>Aus</i> Paddy .. .. .                                   | 40              | 281.05  | 11,242.00   |
| 2. <i>Aman</i> Paddy .. .. .                                  | 50              | 280.99  | 14,049.50   |
| 3. I.R. 8 ( <i>kharif</i> ) .. .. .                           | 4               | 337.92  | 1,351.68  |
| 4. Potato .. .. .   | 1               | 679.48  | 679.48  |
| 5. H. Y. Wheat .. .. .  | 30              | 241.21  | 7,236.30  |
| 6. N. P. Wheat .. .. .  | 5               | 202.18  | 1,010.90  |
| 7. Summer vegetables .. .. .                                  | 15              | 288.33  | 4,324.95  |
| 8. Winter vegetables .. .. .                                  | 2               | 471.13  | 942.26  |
| 9. Lentil .. .. .   | 1               | 145.96  | 145.96  |
| 10. I. R. 8 ( <i>rabi</i> ) .. .. .                           | 2               | 345.84  | 691.68  |
| Total (A) .. .. .   | —               | —   | 41,674.71   |
| <i>Unirrigated area</i>                                       |                 |   |   |
| Aman Paddy .. .. .  | 96              | 248.37  | 23,843.52   |
| Total (B) .. .. .   | —               | —   | 23,843.52   |
| Associated cost (A—B) = Rs. 41,674.71 — 23,843.52 = 17,831.19 |                 |   |   |

\* Includes cost of seed, manures and fertilizers, plant protection, human and bullock labour, interest on capital, land revenue, depreciation on farm implements, but not irrigation. Detailed break-up of cost items could not be given for brevity and economy of space.

## APPENDIX B

## ANNUAL COST OF INSTALLATION AND MAINTENANCE

| Item of investment   | Expected life (years) | Capital invested (thousand rupees) | Annual amortized value in thousand rupees at the interest rate of |              |             |
|--|-----------------------|------------------------------------|---|--------------|-------------|
|  |                       |                                    | 5 per cent  | 7.5 per cent | 10 per cent |
| 1. Drilling of tube-well including all fitting, fixing, etc. . . . . | 25                    | 27700.00                           | 1.965   | 2.482        | 3.051       |
| 2. Pump house and operator's quarter                                 | 30                    | 8670.00                            | 0.568   | 0.734        | 0.920       |
| 3. Pumping plant . . . . .   | 10                    | 8500.00                            | 1.100   | 1.236        | 1.383       |
| 4. Internal wiring . . . . .   | 12                    | 962.00                             | 0.108   | 0.124        | 0.141       |
| 5. Water transmission lines . . . . .                                | 40                    | 24053.00                           | 1.402   | 1.976        | 2.460       |
| 6. Overhead electric transmission line                               | 12                    | 26170.00                           | 2.952   | 3.377        | 3.840       |
| 7. Total . . . . .   |                       |                                    | 6.095   | 9.929        | 11.795      |
| 8. Other* annual costs . . . . .                                     |                       |                                    | 4.722   | 4.722        | 4.722       |
|  |                       |                                    | 10.817  | 14.651       | 16.517      |

\* The costs were calculated on the basis of 8 hours working period of the tube-well. For 16 hours working period a day these costs are assumed to be twice of those shown below:

|  | Rs.             |
|--|-----------------|
| (a) Pay and establishment of the operator and one water transmission assistant . . . . . | 3,860.64        |
| (b) Cost of repair . . . . .   | 237.12          |
| (c) Lubricating oil, etc. . . . .  | 624.00          |
|  | <u>4,721.76</u> |