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CHAPTER - III

METHODOLOGY OF THE STUDY

3.1 Introduction :

The main objectives of this chapter are to explain

i) The choice of the topic for this study.

ii) The methodology of the study.

3.2 The topic of the study :

Here our topic of study is " Economics of biogas plants - A case study of Arag village".

3.2:1 Importance of biogas plants :

Biogas plants are accepted as the best alternatives in the present predicament of fuel shortage and expensive nature of chemical fertilizers. The biogas plant converts the dung and other organic matter into two useful products viz. inflamable gas and good quality of manure. Biogas provides a smokeless high efficiency fuel for cooking, lighting and producing motive power for engines. The manure obtained from biogas plant has higher nutritive value as compared to that of ordinary farmyard manure. So biogas plant is a very useful device for agricultural and rural development. It is an effective instrument in

transforming the socio-economic conditions of the people in rural areas.

3.2:2 Benefits of biogas plants :

Major benefits of biogas plants are as follows :

1) It provides alternative and inexhaustible source of energy.

2) It provides high quality organic manure which increases the crop yield by 10 to 25 % more than farm yard manure.

3) Biogas is a pollution free and hygienic energy resource. Its combustion is complete, smokeless and dustless.

4) The collection of cattle dung for production of biogas decreases the breeding of flies and mosquitoes and thus improves sanitation and enviromental hygiene. Thus the spread of diseases is effectively prevented; improving rural health.

5) It operates engines for power generation and pumping water for irrigation purposes.

6) It provides pollution free fuel and cooking without tears for the housewives.

3.3 The Scope :

The following are objectives of the study.

1) To examine the structure of fixed cost of biogas plants.

2) To examine the structure of variable costs of biogas plants.

3) To examine the revenue structure of biogas plants.

4) To identify the optimum size of biogas plants and the factors affecting it.

5) To asses the social impact of biogas plants.

3.4 Area and reference period :

The village Arag is selected as the village of study for this particular survey. This particular village is selected because it is his native place. In a small village like Arag there is a large number of biogas plants, giving a representative sample to study the above mentioned objectives. We also selected this village because it was managable for the researcher to conduct a survey. The main reason of selecting Arag as village of study is that it covers the major and different types of biogas plats. This made it easy to compare the different models of biogas plants.

We selected the year 1987-88 for the study of biogas plants in Arag village. Even though the reference period was only one year, it covers a span of 5 yers i.e. from 1982-83 to 1987 to 1988. It was so because majority of biogas models were constructed during the span of five years only. The highest number of biogas plants were constructed in the year 1985 because there was a mason's training camp for construction of biogas plants in Arag village.

3.5 **Methodology :**

In this chapter we are giving the detail the information and the survey which is conducted by the researcher. The detail picture of my present study is as follows :

1) In the initial stage I have tried to give the history and growth of biogas plants in India, Maharashtra state, Sangli District and Miraj Taluka. I have also tried to explain what is meant by biogas. In this chapter I have given the review of literature of biogas plants and the studies made by different authorities.

2) Here we try to explain the profile of Arag village in respect of location, total land, cropping pattern, population, livestock in general and profile of biogas plants in particular.

Table No. 3.1

CAPACITYWISE CLASSIFICATION OF BIOGAS PLANTS IN ARAG VILLAGE ACCORDING TO DIFFERENT MODELS OF BIOGAS PLANTS.

Model	Capacity of plants				Total
	2 cu.m.	3 cu.m.	4 cu.m.	6 cu.m.	
Janata	6	32	18	4	60 (85.71)
K.V.I.C.	0	0	1	0	1 (1.42)
Shivasadan (K.V.I.C.)	2	0	0	0	2 (2.85)
Dinbandhu	0	5	2	0	7 (10.00)
Total	8	37	21	4	70 (100)

(N.B. : Figures in the brackets show percentage to the total number of plants).

There are three models (i.e. Janata, K.V.I.C., (Shivasadan) and Dinbandhu) in Arag village.

1) The biogas plants of capacity 2 cu.m., 3 cu.m., 4 cu.m., and 6 cu.m. of Janata model are 6,32,18 and 4 respectively the total number of Janata model plants is 60 and it is the highest in Arag village.

2) The researcher first of all pre-tested the questionnaire with some owners of biogas plants. He discussed some of the problems with the biogas plant holders and then prepared a final questionnaire which is given in Appendix 1 to Chapter III.

3) With the help of printed questionnaire, I visited the biogas plant holders and filled up the questionnaire with the help of interviews and discussions with biogas plant holders. To fill up the 70 questionnaire I spent nearly 20 days (from 11th November 1988 to 20th November 1988 and 30th June 1988 to 9th July 1989.)

4) In this study the relevent information from all the biogas plants in operation during the year 1987-88 in Arag village is collected for this purpose. I have studied 70 biogas plants in Arag village with different capacities and models.

5) The seconday data is also collected from different offices like Khadi and Village Industries Board Office, Bombay and Sangli, Mantralaya, Government of Maharashtra Bombay, District Statistical office Sangli, Zilla Parishad Sangli, Collectorate Sangli, Panchayat Samiti Miraj and Grampanchayat of the village Arag.

6) Determinant factors of fixed costs, variable costs of biogas plants and the revenue obtainable from the biogas plants of different capacities are also studied.

i) The value of bricks, cement, sand and labour charges are worked out at the current prices of that particular year in which the plant is constructed.

ii) The value of dung is calculated in terms of the value of dung cakes. The rate at which the dung cakes are sold in Arag village is Rs. 10/- per hundred. The weight of one basket of wet dung is 10 Kg and with the help of one basket of wet dung 10 dung cakes are prepared. Therefore the value of one basket of wet dung is Rs.1/-

iii) The economic life of biogas plant is 40 years. By assuming 40 years as economic life of biogas plant, we have calculated the depreciation cost of plants.

iv) The value of manure is calculated by assuming the current prices of farm yard manure. The price of farm yard manure is Rs.60 per cart load or Rs. 500 per lorry in the Arag village.

v) The value of gas which is particularly used for cooking purpose is estimated by using equivalent value of kerosene. One man requires kerosene of Rs.230/- per year for cooking and water heating. We have calculated the average members of family whose food is cooked on biogas and then converted the value of gas into equivalent value of kerosene.

APPENDIX NO. 1

QUESTIONNAIRE

" Questionnaire regarding the bio-gas plants in Arag village".

1) Information of the holder of bio-gas plant.

1.A Name :

1.B. Religion :

1.B:1. Caste :

1.C. Village :

1.D. Occupation :

1.E. Total number of the family :

1.E:1. Adults:

1.E:2. Children :

1.F. Time and date of interview :

2) Information regarding the agriculture.

2.A. Total holding of Land (in hectares):

2.B. Irrigated land (in hectares):

2.C. Non-irrigated Land (in hectares):

2.D. Waste land (in hectares):

2.D:1. Main crops :

2.E. Total number of livestock :

2.E:1. She buffelows :

2.E:2. Cows :

2.E:3. Bullocks :

2.E:4. Calves :

2.E:5. Sheep and Goats :

2.E:6. Others :

3) Information regarding the bio-gas plant :

3.A Model of biogas plant :

3.B. Capacity of biogas plant :

3.C. Date of construction :

3.D. Lavatory connected or not. Yes / No.

3.E. If not why ?

4) Information regarding fixed cost of biogas plant :

4.A. Total fixed cost of plant (in Rs.)

4.B. Labour charges of pit digging (in Rs.)

4.C. Value of bricks and sand (in Rs.)

4.D. Value of cement (in Rs.)

4.E. Labour charges of plant construction (in Rs.)

4.F. Whether the plant is constructed in the mason's training camp of costruction of biogas plants. Yes / No.

4.G. Price of burner (in Rs.)

4.H. Cost of construction of Lavatory (in Rs.)

4.I. Paint (in Rs.)

4.J. Other (in Rs.)

4.K. Whether do you get technical guidance Yes / No.
If yes, from whom ?

5) Information regarding variable cost :

5.A. Dung daily used in biogas plant (in baskets)

5.B. Daily time given for mixing dung and water (in hours)

5.C. Maintenance cost of a plant per year (in Rs.)

5.D. Expenditure on water supply per year (in Rs.)

6) Information regarding credit supply :

6.A. Name of institution supplying credit :

6.B. Total loan (in Rs.):

6.C. Period of loan Years.

6.D. Rate of interest %

6.E. Subsidy by Governments (in Rs.):

6.F. Subsidy by co-operative sugar factory (in Rs.):

6.G. Total subsidy (E + F) (in Rs.):

7) Information regarding revenue :

7.A. Biogas daily in hours :

7.B. No. of persons whose food is cooked on biogas burner

7.C. Use of gas for lighting (No.of Lamps and hours)

7.D. Total manure per year (in cart/Lorry) :

7.E. Whether the manure is used for farm or for sale.

Yes / No.

If yes, how many carts/lorry :

7.F. Total manure before setting up biogas plant (in carts or lorries) :

7.G. Increase or decrease in supply of manure after adoption of plant (in carts or lorries):

8) Quantity of dung used for other than biogas per day :

8.A. For direct manure (in baskets) :

8.B. For preparation dung cake (in baskets):

8.C. For terrassing (in baskets):

8.D. For sale (in baskets) :

9) Other information :

9.A. Condition of biogas plant.

Good	Fair	Broken	Not used	Needs repair

9.B. Use of lavatory by households :

10) According to you which plant is suitable ? Why ?

11) Repayment of Debt :

11.A. Total instalment of debt :

11.B. Repayment (in Rs.)

11.C. Repayable (in Rs.)

12) Which capacity of plant is essential for you ? Why ?

13) Are you satisfied fully with biogas plant ?

Yes / No.

14) After using the biogas plant there is no trouble of mosquotoes and house flies.

Yes / No.

15) There is no trouble of collecting the fuel or preparing dung cakes.

Yes / No .

16) other benefits received by you.

17) The attitude of momen about biogas and biogas plant.