# Chapter–5

# The Methodology

This is the sell thought out tools, techniques and methods to organize research work and inquiry, may be with the help of instruments, chemicals or statistical tools or with a combination of all these components. Sometimes, methods are conventional or readily available, in other situation, we need to create it suitably…….

The deliberation on the methodology has been made to understand the concept, methods and techniques which were utilized to design the study, collection of information, analysis of the data and interpretation of the findings for revelation of truths and formulation of theories. This chapter deals with the method and a procedure used in the study and consists of eight main parts-

A. Locale of Research.
B. Pilot Study.
C. Sampling Design.
D. Empirical Measurement of the Variables.
E. Preparation of Interview Schedule.
F. Pre-testing of Interview Schedule.
G. Techniques of Data Collection.
H. Statistical Tools used for Analysis of Data.

**A. Locale of Research**

Deonhat Gram Panchayat of Coochbehar Sadar Block-1,Nayarhat Gobarachara Gram Panchayat of Dinhata-2 Block of Coochbehar district in West Bengal were purposively selected for the study. The two villages namely Ghegirghat and Karola, each of which is situated in two different blocks respectively were selected by random sampling. The area had been selected for the study because of- (a) There is ample scope for collecting relevant data for the present study, (b) Acquaintance with the local people as well as the local language, (c) The concern area was easily accessible to the researcher in terms of place of residence, (d) The area was very easily accessible to the researcher in terms of transportation and (e) The closure familiarities of the student researcher with the area, people, officials and local dialects.

**B. Pilot Study**

Before taking up actual fieldwork, a pilot study was conducted to understand the area, its people, institution, communication and extension system and the knowledge, perception and attitude of the people towards the adoption of organic cultivation. An outline of the socio-economic background of the farmers of the concerned village, their opinion towards organic cultivation, Innovation-decision process, Discontinuance, Rejection, Adoption, Reinvention and helped in the construction of reformative working tools.

**C. Sampling Design**

Purposive as well as simple random sampling techniques were adopted for the study. For selection of state, district, block and gram panchayat purposive sampling techniques was adopted because the area was ideal for present study, convenient for researcher and having the infrastructural facilities and in case of selection of villages and respondents simple random sampling technique was taken up.

**Sampling Technique and Sampling Design**

| Step | Items | Level | | Approach |
|---|---|---|---|---|
| 1 | State | West Bengal | | Purposive |
| 2 | District | Coochbehar | | Purposive |
| 3 | Subdivision | Dinhata | Coochbehar Sadar | Purposive |
| 4 | Block | Dinhata-2 | Coochbehar Sadar-1 | Purposive |
| 5 | Gram Panchayat | Nayarhat, Gobarachara | Deonhat | Purposive |
| 6 | Villages | Karola | Ghegirghat | Random |
| 7 | Respondents | 30 | 20 | Random |
| **Total respondents = 50.** | | | | |

**D. Empirical Measurement of the Variables**

After reviewing various literature related to the field of study and consultation with the respected chairman of Advisory Committee and other experts, a list of variables was prepared. On the basis of the selected variables, a schedule was formed.

**In organic farming, a plethora of crops should have been considered, but here paddy has been considered as the indicator crop to estimate the organic farming behaviour as a whole.**

**a. Independent Variables**

- **Age ($X_1$)**


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In all societies, age is one of the most important determinants of social status and social role of the individual. It is said that young farmers are more inclined to the change than the aged farmer who usually stick to their traditionally bound old practices. In the present study, age of the respondent was measured on the basis of their chronological age at the time of investigation.

- **Education ($X_2$)**

Education is instrumental in building personality structure and helps in changing one's behaviour in social life. Education may be conceptualized as the amount of formal schooling attained/ literacy acquired by the responded. To quantify the educational status of the respondents, the technique was followed by Pareek and Trivedi (1964) in their socio-economic status scale-rural was used. The no.of people is as follows-

| Level of education | No. of people |
|---|---|
| Upto Madhyamik | 35 |
| Higher secondary | 9 |
| Graduate and above | 6 |

- **Family size ($X_3$)**

To quantify the family size of the farmers the following technique developed by Pareek and Trivedi (1964) in their socio-economic status scale-rural was used and the no.of members was as follows-

| Family size | No.of members |
|---|---|
| Up to 5 members | 33 |
| Above 10 members | 14 |
| Above 10 members | 3 |


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- **Cropping Intensity($X_4$)**

**C**ropping intensity has been conceptualized as the proportion of total annual cropped area to the size of holding expressed in percentage.The cropping intensity is calculated by the formula-

$$Cropping\ intensity = \frac{Total\ annual\ cropped\ area}{Size\ of\ holding} \times 100$$

- **Land Holding ($X_5$)**

The amount of land owned by a person is an important parameter to assess the economic status of the person in the society. The following no.of respondents were given to the land holding categories mentioned below, after discussion with the respondents-

| Land holding | No. of respondents |
|---|---|
| Upto 5 bigha | 43 |
| Above 5 bigha | 07 |

**6. Home stead area ($X_6$)**

The amount of land owned by a person is an important parameter to assess the economic status of the person in the society. The following no.of respondents were given to the land holding categories mentioned below, after discussion with the respondents-

| Home stead area | No. of respondents |
|---|---|
| Upto 0.5 bigha | 35 |
| Above 0.5 bigha | 15 |


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**7. Area under horticultural crops($X_7$)**

The amount of land owned by a person is an important parameter to assess the economic status of the person in the society. The following no.of respondents were given to the land holding categories mentioned below, after collecting data-

| Area holding horticultural crops | No. of respondents |
|---|---|
| Upto 0.5 bigha | 09 |
| Above 0.5 bigha | 41 |

**8. Area under field crops($X_8$)**

The amount of land owned by a person is an important parameter to assess the economic status of the person in the society. The following no.of respondents were given to the land holding categories mentioned below, after collecting data-

| Area holding field crops | No. of respondents |
|---|---|
| Upto 5 bigha | 16 |
| Above 5 bigha | 34 |

**9. Irrigation Status($X_9$)**

In the present study irrigation status is calculated is as follows-

$$\frac{\text{Area of the land under irrigation}}{\text{Net cropped area}}$$

**10. Application of organic manure($X_{10}$)**

Fresh manures from cattle and other ruminant animals, goats and sheep amongst the most common, contain cellulose decomposing bacteria along with active digestive enzymes. These enzymes contribute to faster heating of the manure which accelerates the decomposition of organic materials by


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the soil microorganisms. The end result of better decomposition of organic material is faster nutrient release to the plant.

**11. Application of green leaf manure($X_{11}$)**

Green manure means planting a crop that is meant to be incorporated into the soil to increase its fertility. Green manuring refers to incorporation of live biomass into the soil in order to supply plant nutrients for the purpose of improving.

The main objective of green manuring is to add nitrogen to the companion or succeeding crop and also to add organic matter into the soil. The following green manures are applied by the farmer is as follows after interviewing them-

| Green manure | Amount(kg/bigha) |
|---|---|
| Dhaincha | 30 |
| Kojuripana | 45 |
| Other (leafy parts of vegetables,etc.) | 30 |

**12. Application of Bio-fertilizer($X_{12}$) :**

Bio-fertilizer or Biological fertilizer can attain a very prominent position because it is most efficient and least damaging way of supply nutrients to the crops.Bio-fertilizer neither refers to synthetic source nor organic source of nutrients. The following bio-fertilizers are applied by the farmer is as follows after interviewing them-

| Bio-fertilizer | Amount(gm/bigha) |
|---|---|
| Azotobacter | 200 |
| Azophos | 100 |
| Azospirillum | 200 |
| Azolla | 1000 |
| Trichoderma viridae | 500 |
| Pseudomonas | 5 |


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**13. Application of compost and vermicompost($X_{13}$)**

A mass of rotted organic matter made from waste is called compost. The compost made from farm waste like sugarcane trash, paddy straw, weeds and other plants and other waste is called farm compost. The average nutrient contents of farm compost is 0.5 percent N, 0.15 percent $P_2O_5$ AND 0.5 percent $K_2O$.

Compost that is prepared with the help of earthworms is called vermicompost. The earthworms may be of local species or more vigorous exotic ones. Earthworms consume large quantities of organic matter and excrete soil as casts. The amount of compost and vermicompost are applied by the farmer is as follows-

| Item | Amount(kg/bigha) |
|---|---|
| Compost | 40-50 |
| Vermicompost | 30-40 |

**14. Application of organic pesticides($X_{14}$)**

Organic pesticides are those pesticide which suppressed the pest from their attack which is pure organic. It is free from chemical composition and mainly it is made by the farmer with own. The following organic pesticides are applied by the farmer is as follows after interviewing them-

| Organic pesticides | Amount(gm/ltr/bigha) |
|---|---|
| Amritapani | 14 |
| Jibamitra | 12 |
| Neem leaf + water(boil) | 10 |
| Garlic and ginger paste | 8 |


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**15. No.of cattles ($X_{15}$)**

Cattles help the farmer by providing cowdung which is used as organic manure. The farmer applied this manure in their for their organic growth. The following are the no. of cattles present among the respondents-

| No. of cattles | No. of respondents |
|---|---|
| Upto 5 | 38 |
| Above 5 | 12 |

**16. Total amount of cowdung($X_{16}$)**

While cow manure is excellent for growing vegetables it is not recommended to use fresh manure directly on the growing area because they will burn tender plant roots.

It should instead be either;

- Applied to an area for future use as sheet compost
- Dug into the garden and allowed to age for at least 30 days
- Composted in a conventional compost heap

**17. Electricity consumption for domestic purpose ($X_{17}$)**

Electricity consumption is calculated in the present study with the formula as follows-

$$\frac{\text{Electricity consumption in a month of a farm family}}{\text{Size of the family}}$$

**18. Electricity consumption for field purpose ($X_{18}$)**

**E**lectricity consumption for field purpose is calculated in the present study with the formula as follows-

$$\frac{\text{Electricity consumption in a month of a farm family for field purpose}}{\text{Size of the family}}$$


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**19. Consumption of daily requirements($X_{19}$)**

Consumption of daily requirements shows that diesel, petrol, LPG, firewoods and kerosene consumed by a farm family in a year. In the present study it has been calculated as follows-

$$\frac{\text{Consumption of diesel, petrol, LPG, firewood and kerosene oil in a year}}{\text{Size of the family}}$$

**20. Exposure to media ($X_{20}$)**

To measure the degree of utilization of mass media sources, each respondent was asked to indicate on a 4 point continuum as how much information they had received about farming from each of the sources. The scoring for the response categories was as follows-

| Items | Score |
|---|---|
| Always | 4 |
| Very Often | 3 |
| Sometimes | 2 |
| Very few | 1 |
| Never | 0 |

**21. Monthly expenditure($X_{21}$):**

Monthly expenditure is the economic measurement of a farmers' status. It is operationally defined as the gross income from all the viable sources of income in a single year. It is measured in terms of rounded of rupees. The gross income is constituted by the total income generated from health, agriculture, education and organic farming. In the present study it has been calculated with the formula as follows-

$$\frac{\text{Total income in a year}}{\text{Family size}}$$


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## b. Dependent Variables :

**1. Productivity obtained by the farmer by organic cultivation ($Y_1$)**

Productivity is defined as the quality of being productive. The organic productivity obtained by the farmer depends on 2 factors-

- Economics-The rate at which organic products/ foods are produced specially output per unit of labour.
- Ecology-The rate at which radiant energy is used by the producer to form organic production.

Organic productivity estimates the difference from inorganic productivity in terms of yield, quality, income, etc. The organic productivity is calculated in the present study with the formula as follows-

$$\frac{\text{Organic production}}{\text{Unit area}}$$

**2. Productivity obtained by the farmer by inorganic cultivation ($Y_2$):**

Productivity is defined as the quality of being productive. The inorganic productivity obtained by the farmer depends on 2 factors-

- Economics-The rate at which inorganic products/ foods are produced specially output per unit of labour.
- Ecology-The rate at which radiant energy is used by the producer to form inorganic production.

Inorganic productivity estimates the difference from organic productivity in terms of yield, quality, income, etc. The inorganic productivity is calculated in the present study with the formula as follows-

$$\frac{\text{Inorganic production}}{\text{Unit area}}$$


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**3. Market value ($Y_3$) :**

The price an asset would fetch in the market place is called market value. Market value is also commonly used to refer to the market capitalization of a publicly-traded company, and is obtained by multiplying the number of its outstanding shares by the current share price. Market value is easiest to determine for exchange-traded instruments such as stocks and futures, since their market prices are widely disseminated and easily available, and is a little more challenging to ascertain for over-the-counter instruments like fixed income securities..In the present study it has been calculated as follows-

(Production/Unit area × Market price)= Market value

**4. Return of the product from organic farming($Y_4$)**

Return from organic product is calculated in the present study with the formula as follows-

(Total amount obtained by selling organic product – Total expenditure in doing organic cultivation) = Return from organic farming.

**5. Return of the product from inorganic farming($Y_5$)**

Return from inorganic product is calculated in the present study with the formula as follows-

(Total amount obtained by selling inorganic product – Total expenditure in doing inorganic cultivation) = Return from inorganic farming.

**6. Return from mixed farming both organic and inorganic farming ($Y_6$)**

Return from mixed farming is calculated in the present study with the formula as follows-


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$$\frac{\text{(Return from organic cultivation + Return from inorganic cultivation)}}{2}$$

**7. Livelihood from organic farming ($Y_7$)**

A person's livelihood refers to their "means of securing the basic necessities -food, water, shelter and clothing- of life". Livelihood is defined as a set of activities, involving securing water, food, fodder, medicine, shelter, clothing and the capacity to acquire above necessities working either individually or as a group by using endowments (both human and material) for meeting the requirements of the self and his/her household on a sustainable basis with dignity. The activities are usually carried out repeatedly.

In 1992 Robert Chambers and Gordon Conway proposed the following composite definition of a livelihood, which is applied most commonly at the household level: "A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term."

In social science, the concept of livelihood extends to include social and cultural means, i.e. "the command an individual, family, or other social group has over an income and/or bundles of resources that can be used or exchanged to satisfy its needs. This may involve information, cultural


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knowledge, social networks and legal rights as well as tools, land and other physical resources."

Livelihood from organic farming is calculated in the present study with the formula as follows-

(Labour wage × No. of labour / unit area )

**E. Preparation of Interview Schedule**

On the basis of the findings of pilot study a preliminary interview schedule was formed with the help of literature and by the assistance of Chairman of Advisory Committee. The interview schedule consisted of three major parts according to the specific objectives of the study.

**F. Pre-testing of Interview Schedule**

Pretesting or preliminary testing is the process of an advance testing of the study design after the schedule/questionnaire has been prepared. The object of pretesting is to detect the discrepancies that have emerged and to remove them after necessary modification in the schedule. It also helps to identify whether the questions are logically organized, the replies could properly recorded in the space provided for or there is any scope for further improvement. After conducting pretesting appropriate changes and modification of the interview schedule have been made. The individuals who responded in pretesting have been excluded in the final sample selected for the study.

**G. Techniques of field data collection**

The respondents were personally interviewed during puja vacation and summer vacation. The items were asked in Bengali as well as English

version in a simple term so that the members could understand easily. The entries were done in the schedule by student investigator himself at the time of interview.

**H. Statistical Tools used for Analysis of Data**

The statistical methods used for analysis and interpretation of raw data were –

1. Mean
2. Standard deviation
3. Coefficient of Variation
4. Correlation of Coefficient
5. Multiple Linear Regression Analysis
6. Factor Analysis

**1. Mean**

The mean is the arithmetic average and is the result obtained when the sum of the value of individual in the data is divided by the number of individuals in the data. Mean is simplest and relatively stable measure of central tendency. The mean reflects and is affected by every score in the distribution.

When the data are expressed in a frequency distribution (grouped), the mean is calculated by using the following formula–

$$X = \frac{\sum_{i=1}^{N} fixi}{N}$$ Where,

x = Mean of the observation.


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fi = Frequency of the class.

xi = Mid value of the class.

N = Total number of observation

**2. Standard Deviation**

Standard deviation (SD) of a set of observation is the square root of the arithmetic mean of the squares of the deviations. The deviations being measured from the arithmetic mean of the distributions. It is commonly denoted by the symbol σ (Sigma). To measure the average deviation from the standard value of the data standard deviation is used. It is less affected by sampling errors and is a more stable measure of dispersion.

The standard deviation of the data grouped in the form of frequency distribution is computed by using the following formula–

$$S.D. = \sqrt{\frac{\sum_{i=1}^{N} fixi^2}{N}} - \left[\frac{\sum_{i=1}^{N} fixi}{N}\right]^2$$

Where,

σ = Standard deviation

N = total No of observation in a particular cell.

X = value of observation in a particular cell

F = Frequency of observation

$\overline{X}$ = mean number of observation

i= any number (e.g. 1, 2, 3) denoting position.

**3. Coefficient of Variation**

A measure of variation which is independent of the unit of measurement is provided by Coefficient of variation. Being unit free, this is useful for


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computation of variability between different populations. The Coefficient of variation is standard deviation expressed as percentage of the mean and is measured by the formula.

$$CV= \frac{Standard Deviation\,(\sigma)}{Mean} \times 100$$

**4. Correlation of coefficient**

When an increase or decrease in one variety is accompanied by an increase or decrease in another variety, the two are said to be correlated and the phenomenon is known as correlation. Correlation coefficient (r) is a measure of the relationship between two variables, which are at the interval or rational level of measurement and are linearly related. A Pearson product-moment "r" is computed by the formula.

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

Where,

| | | |
|---|---|---|
| X and Y | = | Original scares in variables X and Y |
| N | = | Number of paired scores |
| ∑XY | = | Each X multiplied by its corresponding Y, then summed |
| ∑X | = | Sum of X scores |
| $\sum X^2$ | = | Each of X squared, then summed |
| $(\sum X)^2$ | = | Sum of X score squared |
| ∑Y | = | Sum of Y scores |
| $\sum Y^2$ | = | Each of Y squared, than summed |
| $(\sum Y)^2$ | = | Sum of Y score squared |


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The range of correlation coefficient is between -1 to +1. This means that -1 is perfect negative correlation and +1 is perfect positive correlation. A perfect correlation is, however, seldom achieved. A correlation coefficient to be acceptable should be statistically significant. Otherwise, we say that no significant relationship exist between the variables.

**5. Multiple Regression Analysis**

Generally a number of antecedent variables simultaneously contribute to influence the consequent variables, as in the case under study. It is of immense practical value to know the extent to which the antecedent variables, individually or jointly, could predict or contribute towards the consequent variable. This was done by computing multiple regression analysis. If Y is the consequent variable and $X_1$, $X_2$, $X_3$…are the antecedent variables; the multiple regression equation is given by the following formula-

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 \ldots\ldots$$

Or, $$Y = a + \sum bx$$

The significance of the b- value was judged by calculating their respective t-values and comparing them to the table, given by Fisher and Yates (1963), with (n-p-1) degree of freedom (where, n = number respondents and p = number of antecedent variables) at 5% and 1% level of significance.

The square root of the ratio of the regression sum of squares to the total sum of squares is known as multiple correlation coefficients and is denoted by R. The square of the multiple correlation coefficients $R^2$ is called the multiple coefficient of determination and represents the fraction of the variation of Y accounted for by its joint association with the variables $X_1$, $X_2$, $X_3$…

Central to the application of multiple regression analysis is the interpretation of the final fitted model. A significant F- value for R means that the fitted model is adequate. The significance of the F- value was judged by comparing it to the table value, given by Fisher and Yates (1963) with P and (n-p-1) degrees of freedom (where, P = number of antecedent variables and n = number of respondents) at 5% and 1% levels.

**6. Factor Analysis**

Factor analysis is a very useful and popular method of multivariate research technique, mostly used in social and behavioral sciences. According to Kothari (1996), factor analysis seeks to resolve a large set of measured variables in terms of relatively few categories, known as factors. This technique allows the researcher to group variables into factors (based on correlation between variables); the factors so derived may be treated as new variables (often termed as latent variables) and their value derived by summing the values of the original variables, which had been grouped into the factor. The meaning and name of such new variable is subjectively determined by the researcher. Since the factors happen to be linear combinations of data, the coordinates of each observation or variable is measured to obtain what are factor loadings. Such factor loading represent the correlation between the variable and the factor and are usually placed in a matrix of correlations of the variables and the factors. In the Factor Analysis the "Principle Component Method" was followed.

**Factor Analysis is used:**

- To reduce the dimensionality of large number of variables to a fewer number of factors.
- To confirm the hypothesized factor structure by way of testing of hypothesis about the structure of variables in terms of expected number of significant factor loading.
- Hence in factor analysis specific and error variables are excluded and only the common variables are taken into account. There are some steps in factor analysis:
- We have to collect data then we have to work out the correlation between the variables.
- It is to explore the possibility of data reduction i.e. initial steps of factor are to be explored. The common method of extraction of factors is Principle Component Analysis (P.C.A).