

Chapter-4

Research Methodology

S K Acharya, S Das, G C Mishra and A Biswas

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

Dumurdaha-Nityanandapur-I GP of the Balagarh block of Hooghly district in West Bengal was purposively selected for the study. The village namely Dadpur was 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 climate change concept.

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 climate change 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	Hooghly	Purposive
3	Subdivision	Chinsurah	Purposive
4	Block	Balagarh	Purposive
5	Gram Panchayat	Dumurdaha-Nityanandapur - I	Purposive
6	Village	Dadpur	Random
7	Respondents	50	Random
Total No. of 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.

a. Independent Variables

Sl. No.	Variables	Notation	Score
1	Age	X1	Chronological age
2	Education	X2	Year of Schooling
3	Family size	X3	Number of family members
4	Income	X4	Annual income/capita
5	Size of Holding	X5	Bigha
6	Operational Land	X6	Economic land/ x5
7	Irrigation Index	X7	Real Value
8	Electric consumption	X8	Bill/month/capita
9	Fuel consumption	X9	Annual xep./capita
10	Market Interaction	X10	No of visit/ month

11	Group Interaction	X11	1-10 scale
12	Distance Matrix	X12	Real value
13	Innovation Proneness	X13	1-10 scale
14	Orientation Towards competition	X14	1-10 scale
15	Planning Orientation	X15	1-10 scale
16	Marketing Orientation	X16	1-10 scale
17	Decision Matrix	X17	1-10 scale
18	Idea Exchange Index	X18	1-10 scale
19	Risk Orientation	X19	1-10 scale

• **Age (x₁)**

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 (x₂)**

Education is instrumental in building personality structure and helps in changing one's behavior in social life. Education may be conceptualized as the amount of formal schooling attained/ literacy acquired by the responded.

• **Family size (x₃)**

To quantify the family size of the farmers the scoring system developed by Pareek and Trivedi (1964) in their socio-economic status scale-rural was used and the scoring was as follows-

• **Income (x4)**

The Annual Income of a person is an important parameter to assess the economic status of the person in the society. Annual income has been scored as family income/ year/ family size.

• **Size of Holding (x5)**

The amount of land owned by a person is an important parameter to assess the economic status of the person in the society. The attribute size of holding had been measured by addition of homestead, cultivable and water land. The unit is Bigha.

• **Operational Land (x6)**

The amount of Operational Land owned by a person is an important parameter to assess the economic status of the person in the society. The attribute Operational Land had been measured by land under economic activity divided by size of holding.

• **Irrigation Index (x7)**

The amount of Irrigated Land owned by a person is an important parameter to assess the economic status of the person in the society. The attribute irrigation index had been measured by (land under full irrigation/ size of holding).

• **Electric Consumption (x8)**

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

• **Fuel Consumption (x9)**

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

• **Market Interaction (x₁₀)**= Frequency of visit to market (how many times in a month)

• **Group Interaction (x₁₁)** =

Statements	10-point scale
Frequency of interaction with Panchayat leader (PL)	
Frequency of interaction with meeting	
Frequency of interaction with group programme	
Frequency of interaction with social service	

• **Distance Matrix (x₁₂)**

	Distance from home(km)
Health centre	
Pacca road	
Market	
Knowledge centre	
Financial institution	

• **Innovation Proneness (x₁₃)**

(Please states whether you strongly agree (9-10), agree (7-8), medium (5-6), disagree (3-4) or strongly disagree (1-2) with the following statements)

Statements	(1-10) scale
A. a) I try to keep myself up-to date with information on new enterprise, but that does not mean I try out all new methods on my form (2)	
b) I fell restless till I try a new enterprise, I have heard about (3)	
c) They talk of many new enterprises these days but who knows in they are better than old once (1)	

B. a) From time to time I have heard of several new enterprises and I have tried out most of them in last few years (3) C. b) I usually wait to see what result my neighbor obtain before I try out the new enterprise (2) c) somehow I believe that the traditional enterprise is the best (1)	
D. a) I am cautious about trying new practices (2) b) I do not see any reason to change this methods (1) c) New practices are promising so I like to adopt them (3)	

• **Orientation Towards Competition (x14)**

(Please states whether you strongly agree (9-10), agree (7-8), medium (5-6), disagree (3-4) or strongly disagree (1-2) with the following statements)

Statements	(1-10) scale
1. The key point of success in a enterprise should not be divulged to other entrepreneurs 2. A better yield in comparison to the neighbors bring more prestige 3. It is of no use to keep information as what other entrepreneur are doing 4. Enterprise competition should be organized for all important enterprises 5. Better enterprising provides opportunities for recognition by the extension officers 6. It is not good for an entrepreneur to become too ambitious in life	

• **Planning Orientation (x15)**

Statements	(1-10) scale
1. Each year one should think afresh about the enterprise to be generated in each type of idea 2. It is not necessary to make prior discussion about the variety of enterprises to be generated 3. The amount of input needed for raising an enterprise	

should be assessed before implementation 4. It is not necessary to think ahead of cost involved in raising enterprises 5. One need not consult an expert for enterprise planning 6. It is possible to increase the output through production plan	
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- **Market Interaction (x16)**

(Please states whether you strongly agree (9-10), agree (7-8), medium (5-6), disagree (3-4) or strongly disagree (1-2) with the following statements)

Statements	(1-10) scale
1. Market news is not useful to an entrepreneur	
2. A entrepreneur can get good money by grading his product	
3. Warehouse can help the entrepreneur to get better price of his product	
4. One should sale his product to the nearest market irrespective of price	
5. One should purchase his inputs from the shop, where his other relatives purchase	
6. One should grow those crops, which have more market demand	

- **Decision Matrix (x17)**

Decision	Self (3)	Diod (2)	Group (1)
purchase			
Bank			
Enterprise			

- **Idea Exchange Index (x18)**

Area	Generated By self (3)	Idea received (2)	Idea borrowed (3)
Enterprise			
Health			
Education			

• **Risk Orientation (x19)**

(Please states whether you strongly agree (9-10), agree (7-8), medium (5-6), disagree (3-4) or strongly disagree (1-2) with the following statements)

Statements	(1-10) scale
A) An entrepreneur should grow enterprise to avoid greater risk involved in growing one or two enterprise B) An entrepreneur should rather take more of a chance in making a big profit than to be content with a smaller but risky profit	
C) An entrepreneur who is willing to take greater risk than the average, the entrepreneurs usually does better financially D) It is good for an entrepreneur to take risk when he knows his chance of success is fairly high	
E) It is better for an entrepreneur not to try new farming methods unless most other have used them with success F) Trying an entirely new method in enterprising by an entrepreneur involves risk but it is worth it	

• **Dependent Variables**

Sl. No.	Variables	Notation
1	Enterprise Creation	y1
2	Enterprise Management	y2
3	Enterprise Adoption	y3
4	Environmental Effect	y4
5	Enterprise ecology	Y

• **Enterprise Creation (y1)**

(Please states whether you strongly agree (9-10), agree (7-8), medium (5-6), disagree (3-4) or strongly disagree (1-2) with the following statements)

Topic	Degree of cognitive Association	Scale (1-10)
Time	Time taken on deciding the topic	
Capital	Initial capital generated	

- **Enterprise Management (y2)**

(Please states whether you strongly agree (9-10), agree (7-8), medium (5-6), disagree (3-4) or strongly disagree (1-2) with the following statements)

Financial Management	Skill (10 points)
Group dynamics	Group cohesiveness
Resource Management	Efficiency level
Market management	Efficiency level

- **Enterprise Adoption (y3)**

Enterprise Accessed	No. of people	percentage
Enterprise communicated	No. of people	percentage

- **Perceived Environmental Effect (y4)**

(Please states whether you strongly agree (9-10), agree (7-8), medium (5-6), disagree (3-4) or strongly disagree (1-2) with the following statements)

Economic Effect(10)	
Social Effect (10)	
Ecological Effect (10)	

- **Enterprise Ecology (Y)**

It is the prime research finding of this thesis work. It is calculated by

$$\text{Enterprise Ecology} = (y1*y2*y3*y4)/4/100$$

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 Variance
4. Correlation of coefficient

5. Multiple regression analysis

6. Path analysis

7. 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–

$$X = \frac{\sum_{i=1}^N f_i x_i}{N}$$

Where,

x = Mean of the observation.

f_i = Frequency of the class.

x_i = 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

= 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 proved by the coefficient of variation. Being unit free, this is useful for comparison of variability between different populations. The coefficient of variation is standard deviation expressed as percentage of the mean.

Coefficient of variation is measured by using the following formula –

$$C.V. = \frac{S.D.}{Mean} \times 100$$

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 scores in variables X and Y

N = Number of paired scores

$\sum XY$ = Each X multiplied by its corresponding Y, then summed

$\sum X$ = Sum of X scores

$\sum X^2$ = Each of X squared, then summed

$(\sum X)^2$ = Sum of X score squared

$\sum Y$ = Sum of Y scores

$\sum Y^2$ = Each of Y squared, then summed

$(\sum Y)^2$ = Sum of Y score squared

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 X₁, X₂, X₃...are the antecedent variables; the multiple regression equation is given by the following formula-

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

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 R² 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 X₁, X₂, X₃...

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.

Stepwise multiple regression

Stepwise regression is a variation of multiple regressions which provides a means of choosing independent variables that yield the best prediction possible with the fewest independent variables. It permits the user to solve a sequence of one or more multiple linear regression problems by stepwise application of the least square method. At each step in the analysis, a variable is added or removed which results in the greatest production in the error sum of squares (Burroughs Corporation, 1975).

6. Path Analysis

The objective of doing Path Analysis is to get a clear picture of the direct and indirect effects of the independent variables on the dependent variable. Variables, through which substantial indirect effects are channeled, are also found out.

Singh and Chaudhary (1977), defined path coefficient as the ratio of the standard deviation of the effect due to a given cause to the total standard deviation of the effect i.e. if Y is the effect and x1 is the cause, the path coefficient for the path from cause x1 to the effect Y is $\frac{\sigma_{x1}}{\sigma_y}$

It is advisable to do path analysis with only those variables which have significant effects on the dependent variable. This may be done by restoring to multiple regression analysis, and selecting those independent variables whose partial b value are significant. This shall enhance clarity of the path analysis.

7. 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).