Chapter 5

Research Methodology

The deliberation on the methodology has been made to understand the concept, methods and techniques which are utilized to design the study, collection of information, analysis of data and interpretation of the findings for revelation of truths and formulation of theories. These chapter deals with the method and a procedure used in the study an consist 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.

Locale of Research:

Ghoragachha village of the Haringhata block of Nadia district in West Bengal was randomly selected for the study. The area has been

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selected for the study because of – a) There is sample scope for collecting relevant data for the present study, b)Acquaintance with the local people as well as local language, c)The concern area was very 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 closer familiarities of the student researchers with the area, people, officials and local dialects.

B. Pilot Study:

Before taking up actual field work 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 changes concept.

C. Sampling Design:

Purposive as well as simple random sampling techniques were adopted for the study.

5.1 Sampling Techniques and Sampling Design

Step	Items	Level	Approach
1	State	West Bengal	Purposive
2	District	Nadia	Purposive
3	Subdivision	Kalyani	Purposive
4	Block	Haringhata	Purposive
5	Gram Panchayat	Rautari	Purposive
6	Village	Ghoragachha	Random
7	Respondants	60	Random

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D. Empirical Measurement of the Variabl

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

5.2 Independent Variables:

SL No	Variables	Notation
1	Age	X1
2	Education	X2
3	Family size	X3
4	Size of holding	X4
5	Homestead land	X5
6	Family income(farm)	X6
7	Family income(off farm)	X7
8	Cropping Intensity	X8
9	Crop mix	X9
10	Livestock	X10
11	Yield of Rice	X11
12	Yield of Pulses	X12
13	Yield of vegetables	X13
14	Exposure to media	X14
15	Disease pest incidence	X15

Age(X1)

In all societies, age is one of the most important determinants of social status and social role of the individual. 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 is building personality structure and helps in changing one's behavior in social life. Education may be

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conceptualized as the amount of formal schooling literacy acquired by the responded.

Family Size(X3)

Number of family members of an individual farmers.

Size of Holding(X4)

The amount of land owned by a person is an important parameter to access the economic status of the person in the society.

Homestead Land(X5)

Amount of land acquired by the home building and surrounding. This total amount is divided by the family size.

Farm income(X6)

Total income of the family from farming is divided by the family size.

Off farm income(X7)

Total income of the family from the occupation other than farming. This is also divided by the family size.

Cropping Intensity(X8)

It has been conceptualizedas the proportion of total annual cropped area to the size of holding expressed in percentage. Its calculated as-

Cropping Intensity=Total annual cropped area/ size of holding × 100

Crop mix(X9)

Total number of crops is being cultivated in a cropping season.

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Livestock(X10)

Per capita possession of livestock i.e total no. of livestock owned by the family is divided by the family size.

Yield of Rice(X11)

Yield of rice in the farmers' field is divided by the family size.

Yield of Pulses(X12)

Yield of pulses in the farmers' field is divided by the family size

Yield if vegetables(X13)

Yield of vegetables in the farmers' field is divided by the family size

Exposure to media(X14)

The number of hours spend by the farmer in watching television, radio or any other mass madia.

Disease pest incidense(X15)

Frequency and intensity of disease pest attack in farmers' field.

Dependent Variabless:

- Y_1 – Man days and monsoon.
- Y_2 –Income and monsoon.
- Y_3 – Migration and monsoon.
- Y_4 – festivals and monsoon.
- Y_5 – Market and monsoon.
- Y_6 – Sociological perception of monsoon.

Sociological perception of monsoon is the sum of all the above mentioned dependent variables (Y1 to Y5).

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Y6=Y1+Y2+Y3+Y4+Y5

E. Preparation of Interview Schedule

On the basis of finding pilot study a preliminary 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 objective of the study.

F. Pre-testing of Interview Schedule

It's the process of advance testing of the study design after the schedule 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. 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 durga puja vacation and summer vacation. The items were asked in local language, Bengali .The entire 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 for analysis and interpretation of raw data were.

a) Mean.

b) Standard deviation.

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c) Coefficient of Variance.

d) Correlation of coefficient.

e) Step down regression analysis.

f) Canonical covariate analysis.

g) Factor analysis

h) Path analysis

a) Mean

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

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

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

Where,

x = Mean of the observation.

fi = Frequency ofthe class.

xi = Mid value of the class.

N = Total number of observation

b) 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. lt is

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commonly denoted by the symbol (Sigma). To measure the average deviation from the standard value of the data standard deviation is used. It is less affected by sampling en-ors 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 –

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

When,

d = Standard deviation

N = total No of observation in a particular coll.

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

c) Coefficient of Variance:

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.

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Coefficient of variation is measured by using the following formula —

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

d) Coefficient of correlation:

When increase or decrease in one variety is accompanied by an increase or in another variety, the two are said to be correlated and Ute 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 Person product-moment "r" is computed by the formula.

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

When,

X and Y = Original scares in variables X and Y

N = Number ofpaired scores

$\sum XY$ = Each X multiplied by its comzsponding Y. then summed

$\sum X$ = Sum ol'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, than summed

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

The range of correlation coefficient is between -1 to +1. This perfect negative correlation +1 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.

e) Step down regression analysis

Stepwise regression is a which provides a means of choosing independent variables that yield the best possible with the fewest independent variables. It permts the user to solve a sequence of one 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 .

f) Canonical covariate analysis

In statistics, canonical-covariate analysis (CCA) is a way of making sense of cross-covariance matrices. If we have two vectors X = (Xi, ..Xa) and Y = (Yl, ... Ym) of random variables, and there are variables, then canonical-correlation analysis will find linear combinations of the Xi and Yj whish have maximum correlation with each other. Virtually all of the commonly encountered parametric tests of significance can be treated as special cases of canonical-correlation analysis, which is the general procedure for investigating the

relationships between two sets of variables. The method was first introduced by Harold Hotelling in I936.

Given two column vectors X = (x_1.....x_a)^{1}and Y = (y_1...y_m)^1 of random variables with finite second moments, one may define the cross-covariance $\Sigma_{xy} = CN(X.Y)$ to be the $n \times m$ matrix whose (i.j) entry is the convarience$^{CON(r,y)}$. In the covariance $^{CON(r,y)}$. In practice, we would estimate the covariance matrix based on sampled data from X and Y (i.e. from a pair of data matrices).

Canonical-correlation analysis seeks vectors a′ and b′ such that the random variables a^1X and b′Y maximize the correlation $\rho = corr(a'X,b'Y)$. The random variables $U = a'X$ and $V = b'Y$ are the first pair of canonical variables. Then one seeks vectors maximizing the same correlation subject to the constraint that they are to be uncorrelated with the first pair of canonical variables; this gives the second pair of canonical variables. This procedure may be continued up to $^{min\{m, n\}}$ times.

g) Factor Analysis

Factor analysis is a very useful and popular method of multivariate research technique, mostly used in social and behavioral sciences. 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

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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.

h) Path Analysis

Path Analysis is a straight forward extension of multiple regression. Its aim is to provide estimations of the magnitude and significance of hypothesized causal connections between sets of variables. Path analysis is a statistical method with a structural model, but not measurement model. In other terms it is called as causal modeling, analysis of co variance structures and latent variable models. The reason for the name is that the techniques allow us to test theoretical propositions about cause and effect without manipulating variables. However, the causal in causal modeling refers to an assumption of the model rather than a property of the output or consequence of the technique. That is, people assume some variables are causally related and the test propositions about them using the technique. If the propositions are supported, it does not prove that the causal assumptions are correct.