Chapter Three

Methodology
3. METHODOLOGY

Historically, Maharashtra state is divided into Marathwada, Vidarbha and Western Maharashtra. Administratively, the state is divided into four divisions and thirty districts. The study pertains to the Marathwada division of Maharashtra State.

Marathwada region comprises in all seven districts viz. Aurangabad, Parbhani, Bhir, Nanded, Osmanabad, Jalna and Latur. Originally, the Marathwada division was consisted of five districts only, however, Jalna and Latur districts have been recently created.

Adoption of sound and feasible methodology is of vital importance in the economic study. It comprises of collection of data, sampling techniques, designing of schedule, analysis of data and presentation and interpretation of results. The different techniques used and methods adopted in this study are presented in this chapter.

One can expect meaningful conclusions from any scientific study if the same is contemplated with the use of appropriate research methodology. Besides, it is usually thought better to discuss the details of the research methodology, prior to presentation of results of the study so that the other readers and research workers can understand the conclusions drawn from such a study in their right perspective. The present chapter is therefore, devoted to discuss, the details of research methodology adopted for the study. Moreover, it deals with the aspects like
the sources of empirical data used in the study, the analytical procedure is adopted for arriving at meaningful results for accomplishing the objectives of the study and various concept underlying it.

SELECTION OF AREA

The study was undertaken in the districts of Marathwada region of Maharashtra state.

SELECTION OF CROPS

Selection of crops based on the existing processing industries in the region. The following processing industries are in existence in the region.

1. Oil Mill
2. Dal Mill
3. Ginning Factory
4. Sugar Factory.

In accordance with the processing industries following crops have been selected for the study purpose viz.

1. Groundnut
2. Sunflower
3. Safflower
4. Tur
5. Gram
6. Cotton
7. Sugarcane
Taking into consideration the important position of the groundnut, sunflower, safflower, tur, gram, cotton and sugarcane in the cropping pattern and processing industry in the region, it was felt that a study of overall changes in respect of area, production and productivity of above crops and study of cost of production and processing cost, the profitability or otherwise after processing and ultimately to know the prospects for agro-based industries in Marathwada is useful.

The present study divided under major six heads.

1. To study the cropping pattern of different districts of the region.

2. To study the performance of selected crops during the period 1960-61 to 1989-90.

3. To study the socio-economic characters of selected farm families.

4. To find out the cost of production of the selected crops on cultivators field.

5. To study the processing cost and find out the profitability after processing.

6. To examine prospects for agro-based industries in Marathwada region.

3.1 TO STUDY CROPPING PATTERN

Cropping pattern is an important indicator to know the position of each crop in total (gross) cropped area. To study the cropping pattern of different districts in the region, relevant data were obtained from the published sources viz.
Season and Crop reports and Epitome of Agriculture published by the Dept. of Agriculture, Maharashtra State.

To depict the cropping pattern, triennium averages ending the year 1989-90 have been worked out. Proportion of area under each crop to gross cropped area is worked out by estimating indices.

3.2 TO STUDY THE PERFORMANCE OF SELECTED CROPS

Under this head, the performance of selected crops in respect of area, production and productivity were studied. An attempt has been made to work-out the mean, S.D., C.V., C.G.R., L.G.R., and R of area, production and productivity of selected crops since 1960-61 to 1989-90. The study is confined to only old five districts of the region as the secondary data are available for the period 1960-61 to 1989-90 only for these districts. The data for new districts are not available.

COLLECTION OF DATA

The time series data in respect of selected seven crops i.e. groundnut, sunflower, safflower, tur, gram, cotton and sugarcane collected from Season and Crop report published by Directorate of Agriculture, Maharashtra State Pune-1 and District wise General Statistical Information of Agriculture Department and from Agricultural Situation in India.

The data were collected for the last 30 years from 1960-61 to 1989-90.
ANALYTICAL TOOLS USED

The statistical analysis of the data was conducted by utilizing the following statistical tools.

1. Arithmetic Mean

It is used to know the central tendencies of the characters like area, production and productivity for the study period as well as different crops under study.

\[
\text{Mean} = \frac{\sum Y_1}{n}
\]

Where \( Y_1 \) = Summation of 'n' observation
\( n = \text{No. of years.} \)

To know the dispersion, standard deviation, standard error and co-efficient of variation were estimated with the following formula.

2. Standard deviation

Standard deviation measures the dispersion between the observations.

\[
\text{S.D.} = \sqrt{\frac{\sum (Y-\overline{Y})^2}{n-1}}
\]
3. Standard Error

Standard error gives the confidence interval or the range for the mean within which it may lie with a given level of significance.

\[ S.E = \frac{S.D}{\sqrt{n}} \]

Where, \( S.E \) = Standard error
\( S.D \) = Standard deviation

4. Co-efficient of variation

Co-efficient of variation is the percentage. Standard deviation expressed in terms of mean. To study the fluctuations of area, production and productivity C.V. were worked out for the study period.

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

Where, \( C.V. \) = Co-efficient of variation
\( S.D. \) = Standard deviation.

Standard deviation can not be compared for two series, when the number of observations are different or the means of the two series are not equal. Hence C.V. serves as the stronger measure for comparison of dispersion or fluctuations or changes of the series. Higher C.V. value indicates more fluctuations or faster changes in the time series data, whereas a lower value of C.V. indicates more stability or lower changes in the time series data of a character.
Mean, S.D., C.V. were estimated to know the changes and fluctuations in area, production and productivity of various crops.

The linear and compound growth rates were estimated to measure the changes in area, production and productivity for overall period with the following formula.

5. Linear equation

\[ y = a + bx \]

This is known as linear growth rate over average.

Where,

\( Y \) = area / production / productivity.

\( a \) = intercept

\( b \) = regression co-efficient

\( x \) = year

\( \overline{y} \) = mean of \( y \)

Semilog or Exponential equation

\[ Y = ab^x \]

Exponential

percentage Compound Growth Rate (CGR) = \( (b-1) \times 100 \)

where,

\( y \) = area / production / productivity

\( a \) = intercept

\( b \) = regression co-efficient

\( x \) = year.

The significance of linear and compound growth rates were tested with the help of correlation coefficient (r) values.
Co-efficient of correlation \( r = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[\sum X^2 - (\sum X)^2][\sum Y^2 - (\sum Y)^2]}} \)

The significance of the estimates were tested at five per cent level and one per cent level with table values. (Fisher and Yates. Table-VIII, PP 63.)

3.3 SOCIO-ECONOMIC CHARACTERS OF FARMERS

General information of the selected cultivators were collected. It includes information relating to family members, educational status, sources of annual income and cropping pattern etc.

The information so collected were analysed and presented in tabular form.

3.4 TO STUDY COST OF PRODUCTION

In this part of the study economics of groundnut, sunflower, safflower, tur, gram, cotton and sugarcane were studied. The cost of production of above crops have been worked out by adopting the following methodology.

Selection of area

The present study was undertaken in Parbhani, Jalna, Nanded, Aurangabad and Latur district of Marathwada region. These districts were purposefully selected because these districts are comes under cost of cultivation scheme implemented by Government of Maharashtra through Marathwada Agricultural University Parbhani.
Selection of farmers

To study the cost of production of selected crops under study 10 cultivators growing each crop from each district were selected. Thus in all 350 farmers were selected for finding out cost of production of selected crops in different districts. The data were collected from the farmers who where already been selected under the cost of cultivation scheme as mentioned above.

Preparation of questionnaire

Survey method of data collection was adopted for this study. The valid and reliable data was collected by personal interviews with the help of specially prepared questionnaire.

An appropriate and carefully drawn questionnaire was prepared keeping in view of the objectives of the study. The questionnaire was prepared by considering different aspects of cost of production. While developing the questionnaire, the available related literature and research records were referred. The data were collected from cultivators by personal contact. Prior to that the questionnaire was pretested for its adoptability and suitability after that questionnaire was finalised for collection of data.

The questionnaire includes:

1) General information of cultivator;
2) Information of land;
3) Cropping pattern adopted by cultivators;
4) Physical quantities of inputs;
5) Yield data.
Collection of data

The data were collected with the help of specially prepared questionnaire with personal interviews method for the year 1991-92. Each sampled farmer was personally contacted for the data collection.

EVALUATION OF INPUTS

Inputs are the factors of production. It refers to those expenses of cultivation that are incurred in form of cash or inputs. b) Monitory inputs.

a) Physical inputs

1) Human labour

Human labour was divided into two different types viz. (a) family labour and (b) hired labour. For the convenience, family labours were charged at the rate of hired labour charges prevailing in the region or actually paid by the cultivator. A working day consists of eight hours.

2) Bullock labour

Bullock labour was charged as per the prevailing rates in the villages under study. Value of owned bullock labour is taken on the basis of hire rate prevailing in the villages.

3) Seed

Actual cost paid by the cultivators for the seed material in the selected area has taken as the expenditure incurred on seed material. Cost of home produced seed was charged at the rate of current market price.
4) Manure and fertilizer

The purchased manure was valued at the actual price paid by the farmers. For the home produced manure the cost was taken into account according to prevailing prices. Fertilizers were valued at the actual price paid by the farmers.

5) Irrigation charges

Expenditure incurred on irrigation was considered on the basis of actual amount paid by the cultivator for the crop under study.

6) Plant protection charges

The actual cost of insecticides and pesticides paid by the farmers was considered.

7) Depreciation charges

Depreciation charges were calculated by straight line method.

(b) Monetary Inputs

1) Land revenue

Land revenue varies according to fertility of land. Actual revenue paid by the cultivator was taken into consideration.

2) Interest on working capital

It is one of the important item in the overhead cost. It was calculated at the rate of 12 per cent of investment on working capital i.e. hired human labour, bullock labour, seed, manure, fertilizers, irrigation, plant protection, land revenue and depreciation on implement, for the crop period.
3) Rental value of land

Rental value of land was worked out as 1/4 of the total value of the produce.

4) Interest on fixed capital

It was charged at the rate of 10 per cent per annum of the value of fixed farm assets.

Output

Output included both main and by-product of the farm. Main and by-product was considered in physical quantity as well as monetary terms. The monetary value was considered as price received by the farmer.

Profit / Loss

Profit or Loss is calculated by deducting expenditure from the total value of product. Profit or loss on cost 'A' = It is calculated by deducting cost A expenditure from the total value of the product. Profit/loss on cost B = means total value of product minus cost B. Profit / loss on cost C = It is calculated by deducting cost C from the total value of product.

Input–Output ratio

It is ratio of total expenditure incurred and total amount received. It indicates return per rupee on investment and points out the efficiency of investment.

Cost concepts used

The analysis of cost of production of selected crops were carried out. The cost concepts used and the procedures followed in the analysis of data pertaining to the cost of production of selected crops are those which are generally adopted in the farm management studies and accepted by the Agricultural Price Commission both at State and National level.
The cost concepts used in the study are:

**Cost 'A'**

It is actual cost paid by the farmer. It includes the following item.

(1) Human labour (hired) (2) Bullock labour (3) Seed
(4) Manure (5) Fertilizer (6) Irrigation charges (7) Plant
protection charges (8) Land revenue (9) Depreciation on
implements (10) Interest on working capital.

**Cost 'B'**

It includes cost 'A' plus rental value of land and interest
on fixed capital.

**Cost 'C'**

It includes cost 'B' plus imputed value of family labour.

**Profit / Loss**

Profit or loss was worked out at cost 'A', cost 'B' and
cost 'C' level.

3.5 TO STUDY COST OF PROCESSING

To examine the processing cost of different agro-processing
units located in the region, the following procedure is fol-
lowed. As mentioned earlier following major agro-processing
units are working in the region (1) Oil Mill (2) Dal Mill (3)
Ginning factory and (4) Sugar factory.

**Selection of processing units**

District wise list of different processing units was
obtained from the District Industrial Centers. A sample of
five units from each processing units were selected randomly.
Thus, in all 20 processing units were selected.
Data collection

The required data such as supervision charges, labour charges, watchman salary, building rent, repair and maintenance, electrical charges, licence fees, processing charges, depreciation, storage charges, miscellaneous charges, business taxes, market fees, hamali charges, transportation charges, interest on working capital were obtained from each processing units with the help of pretested questionnaire. Final product obtained with cost and prices taken into consideration. The data pertains to the year 1991-92.

Preparation of questionnaire

A well designed questionnaire was prepared which includes information relating to major activity and ancillary activity of the processing units which also includes the difficulties faced by the processing units in obtaining the raw material, procedural difficulties etc. The questionnaire was pre-tested and modified question was used to obtain the desired data.

Analysis of data

The collected data were processed and systematically analysed in a tabular form. The analysis is carried out on per unit basis i.e. per quintal or per tonne etc.

The average figures of different five units have been presented in the fifth chapter.

An attempt was made to find out the item wise processing cost, final processed product obtained, its value in the market and finally its profitability was worked out.
3.6 TO EXAMINE PROSPECTS FOR AGRO-BASED INDUSTRIES

Development of agro-based industries is an integral part of overall rural development. These includes processing of agricultural produce. We attempt to identify opportunities for agro-based industries in Marathwada region. For this purpose we have studies resources of agro-processing industries in detail and survey reports of well known agencies viz. Tata Economic Consultancy Services, Marathwada Development Corporation ltd., Agricultural Universities reports and reports of Sanyojan Samiti on 'Marathwada-2001' etc.