CHAPTER-III

METHODOLOGY

The methodology adopted for the present investigation is discussed in this chapter. It deals with details of analytical procedure adopted to fulfill the objectives of the study. The various phases are discussed as under.

3.1 Coverage of the study
3.2 Source of data
3.3 Designing and pre-testing of survey schedule
3.4 Methods of analysis

3.1 Coverage of the study

3.1.1 Selection of study area

The Gujarat state comprises of 33 districts, among them Amreli, Bhavnagar, Botad, Devbhumi Dwarka, Gir Somnath, Junagadh, Jamnagar, Morbi, Porbandar, Surendranagar and Rajkot are covered under the Saurashtra region. It is also noteworthy that Saurashtra region alone contributes area of 93.37 per cent area under onion cultivation and 94.47 per cent of onion production in year 2016-17 (Anon., 2017b).

Bhavnagar districts was selected purposively as it collectively covers 67.82 per cent area of onion cultivation with 69.88 per cent share in production of onion in the state in the year 2016-17 (Anon., 2017b). Onion is cultivated in rabi as well as in summer season. However, the proportion of area under rabi cultivation is about 77.31 per cent of total area under cultivation. So far as the cultivation of onion is concerned, different varieties of onion are cultivated in different regions. But, Bhavnagar district mainly cultivate red onion. Therefore, the required information from the selected respondents was collected for red onion during the rabi season in the year 2016-17.
3.1.2 Selection of talukas

The list of all talukas of Bhavnagar district along with their area under onion cultivation is presented in Table 3.1. It can be seen that in Bhavnagar district, Mahuva taluka occupies the highest area (46.74%) under onion cultivation followed by Talaja taluka (38.53%). Looking to the relatively higher share of each talukas to the total area under onion crop in the district, two talukas *i.e.*, Mahuva and Talaja talukas from Bhavnagar district were selected.

**Table 3.1: Taluka wise area under onion cultivation in Bhavnagar (2016-17)**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of taluka</th>
<th>Area in hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mahuva</td>
<td>12650</td>
</tr>
<tr>
<td>2</td>
<td>Talaja</td>
<td>10428</td>
</tr>
<tr>
<td>3</td>
<td>Jesar</td>
<td>1750</td>
</tr>
<tr>
<td>4</td>
<td>Palitana</td>
<td>1000</td>
</tr>
<tr>
<td>5</td>
<td>Bhavnagar</td>
<td>525</td>
</tr>
<tr>
<td>6</td>
<td>Ghogha</td>
<td>400</td>
</tr>
<tr>
<td>7</td>
<td>Sihor</td>
<td>275</td>
</tr>
<tr>
<td>8</td>
<td>Gariyadhar</td>
<td>25</td>
</tr>
<tr>
<td>9</td>
<td>Umrala</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>Vallabhipur</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>27063</strong></td>
</tr>
</tbody>
</table>

3.1.2 Selection of villages

The list of villages Mahuva and Talaja taluka of highest area under onion cultivation is presented in Table 3.2. It can be seen that in Mahuva taluka, Kumbhan village occupies the highest (486 hectares) area under onion cultivation followed by Tared and Kalsar. While In Talaja taluka, Dihor village occupies the highest (350 hectares) area under onion cultivation followed by Zanjmer and Thaliya. Three villages of Mahuva taluka namely Kumbhan, Tared and Kalsar while three villages from Talaja taluka namely Dihor, Zanjmer and Thaliya were selected on the basis of concentration of area. Thus, total 6 villages were selected for the study.
Table 3.2: Village wise area under onion cultivation in Mahuva and Talaja taluka (2016-17)

<table>
<thead>
<tr>
<th>Name of village</th>
<th>Area in hectares</th>
<th>Name of village</th>
<th>Area in hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahuva taluka</td>
<td></td>
<td>Talaja taluka</td>
<td></td>
</tr>
<tr>
<td>Kumbhan</td>
<td>486</td>
<td>Dihor</td>
<td>350</td>
</tr>
<tr>
<td>Tared</td>
<td>408</td>
<td>Zanzmer</td>
<td>340</td>
</tr>
<tr>
<td>Kalsar</td>
<td>320</td>
<td>Thaliya</td>
<td>300</td>
</tr>
<tr>
<td>Mota Khuntavada</td>
<td>285</td>
<td>Devli</td>
<td>230</td>
</tr>
<tr>
<td>Kinkaria</td>
<td>240</td>
<td>Trapaj</td>
<td>210</td>
</tr>
<tr>
<td>Goras</td>
<td>202</td>
<td>Bhadraval</td>
<td>208</td>
</tr>
<tr>
<td>Valavav</td>
<td>196</td>
<td>Jaspara</td>
<td>190</td>
</tr>
<tr>
<td>Vangar</td>
<td>185</td>
<td>Datha</td>
<td>180</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2322</strong></td>
<td><strong>Total</strong></td>
<td><strong>2008</strong></td>
</tr>
</tbody>
</table>

3.1.3 Selection of respondents

A list of the farmers growing onion in each of the selected villages was prepared. Looking to the financial and time constraints with the hand of the researcher, randomly 20 onion growing respondents from each of the selected villages were selected as an ultimate sample. In the selection of respondents according to different categories of the farm, proportional sampling method was adopted.

They are classified in to four different farm size groups viz., Marginal (up to 1.00 hectare), Small (>1.00 to 2.00 hectares), Medium (>2.00 to 4.00 hectares) and Large (above 4.00 hectares). Thus, in all, 120 respondents of onion growers spread over six villages of two talukas of Bhavnagar districts comprise as the ultimate sample for the study Table 3.3 and Figure 3.1.
Table 3.3: Details regarding sample villages and onion growers

<table>
<thead>
<tr>
<th>District</th>
<th>Taluka</th>
<th>Village</th>
<th>Farm size groups</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Marginal</td>
<td>Small</td>
</tr>
<tr>
<td>Bhavnagar</td>
<td>Mahuva</td>
<td>Kumbhan</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tared</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kalsar</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Talaja</td>
<td>Dihor</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zanjmer</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thaliya</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

3.1.4 Selection of markets and traders

For the study of marketing aspects of onion, the Bhavnagar and Mahuva regulated markets were selected on the basis of quantity of onion arrived in the market. The arrival of onion in Bhavnagar and Mahuva regulated markets was 15000 metric tonnes and 75000 metric tonnes, respectively in the year 2016-17. A sample of eight respondents from each of different marketing functionaries like local merchants, primary wholesaler, secondary wholesaler, commission agent and retailer was randomly selected from both the selected markets to study various marketing aspects. Thus, a total sample of 80 respondents from different marketing functionaries was selected for the study.

3.2 Source of data

The required primary data regarding socio-economic characteristics, land holdings, cropping pattern, inventory of implements and machinery, cost of cultivation, constraints faced by cultivators during production and marketing were collected by interviewing onion growers. Further, the data on disposal pattern of total output, marketable surplus, farm harvest prices and marketing expenditure were also collected from the respective respondents. For this purpose a specially designed pre-tested schedule/questionnaire was used.
3.3 Designing and pre-testing of survey schedule

Considering the nature of the study and for obtaining correct and perfect information from the respondents, it was decided to collect information through personal interview using the interview schedule. While preparing the interview schedule, the available related literature and research reports were referred. Some ambiguous points were clarified through discussing with experts and knowledgeable persons in the area. On the basis of their suggestions, the interview schedules were revised and before finalizing the interview schedule, it was pre tested with ten onion growers of the study area.

3.4 Methods of analysis

Keeping in view the stipulated objectives of the study, the primary data on cost of production, marketing and socio-economic characteristics were complied and analyzed systematically. The major analytical tools employed for the study included tabular analysis and production function analysis. The details of each of these tools are narrated as under.

3.4.1 Tabular analysis

Tabular analysis was used to work out descriptive statistics such as mean, percentage, etc., for making a comparison of general characteristics of sample farms and in other analysis wherever necessary. Simple comparisons were made on the basis of percentage. Besides, wherever necessary cumulative percentages were calculated. Ratios were also calculated for the interpretation of data.

3.4.2 Economics of onion cultivation/ production

These two concepts are often used in economic analysis of crops. Cost of cultivation refers to the economic valuation of variable inputs and fixed inputs per unit area say per hectare, while the cost of production for the crop is computed in terms of output per unit of weight say per quintal.

3.4.2.1 Cost concepts

The cost concepts used in the present analysis are those laid down in the farm management study.
**Cost-A:** The following items are included in Cost-A

A. Cost of hired human labour
B. Cost of hired and owned bullock labour
C. Tractor charges
D. Cost of planting materials
E. Cost of manures (owned and purchased)
F. Cost of fertilizers
G. Cost of plant protection chemicals
H. Irrigation charges
I. Depreciation
J. Interest on working capital
K. Miscellaneous

However, Cost-A can be divided into two parts viz., Cost-A₁ and Cost-A₂, as there was no tenant farmers in the selected sample the same is treated as Cost-A in the study. The expenses incurred towards land revenue, transport charges, charges to contract work etc., are included under the head of other paid out expenses.

**Cost-B:**

Cost-A + Imputed rental value of owned land + Imputed interest on owned fixed capital (excluding land)

**Cost-C₁:**

Cost-B + Imputed value of family labour

**Cost-C₂:**

Cost-C₁+ 10 per cent of Cost-C₁ as managerial charges

**Cost of Production per Quintal:**

Total Cost (Cost- C₂) / Yield of main product in quintal

**Cost of production on different cost:**

Different cost viz; Cost-A, Cost-B, Cost-C₁ and Cost-C₂ / Yield of main Product in quintal
3.4.2.2 Imputation procedure for owned inputs

The value of purchased inputs was recorded as reported by the farmers after its verification, while some of the inputs used in the production process came from the family resources. In computing the cost of cultivation, it was necessary to compute value of these owned inputs. The procedures used for computation of values were indicated below.

(a) Family labour was valued at the rate of usual labour prevailing for different operations in the sample villages.
(b) Owned bullock labour was valued at the prevailing marketing rate.
(c) The value of farm produced manure and plant materials were computed at the market price.
(d) The cost of irrigation and tractor was considered at the prevailing market rate.
(e) Interest on working capital was charged at the rate of 12 per cent per annum for the duration of the crop.
(f) Depreciation on buildings used for the storage purpose was calculated at the rate of 5 per cent on katcha and 2 per cent on pakka buildings.
(g) Rental value of farmers owned land was charged at the prevailing rate in the villages.
(h) Interest on owned fixed capital was calculated at the rate of 10 percent per annum.

3.4.2.3 Income measures

The various income measures used in the present study are shown as under.

A. Value of gross output (Gross Income)

It is calculated by considering the total production of onion in quintal and price prevailing of product per quintal.

B. Farm business income

Gross return – Cost-A

C. Family labour income

Gross return – Cost-B
Methodology

D. Intensive income
Net income + Rental value of owned land + Interest on fixed capital

E. Farm investment income
Farm business income – Imputed value of family labour

F. Net income
Gross return – Cost-C

3.4.3 Profitability measures

A. Returns:
Gross return = value of main product + by-product

B. Profitability:
Profitability = VOP (Value of output) – Cost-C

3.4.4 Production function analysis

Production function shows the technical relationship between output and inputs used in the production process. In order to determine the efficiency of resources used in the production of onion, the following form of Cobb-Douglas production function was fitted. The analysis was carried out on per hectare basis using the SPSS software. Gross income was considered as dependent variable and other variables as independent variables. The variables included and functional form of fitted equation is given below.

\[ Y = ax_1^{b_1} x_2^{b_2} x_3^{b_3} \ldots \ldots x_n^{b_n} \]

The original equation was converted into log linear form and the parameters will be estimated by using the ordinary least square method.

\[ \ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + e \]

Where,
\[ Y \] = Gross income of onion (Rs. /ha)
\[ X_1 \] = Cost of human labour (Rs. /ha)
\[ X_2 \] = Cost of bullock and machine power (Rs. /ha)
\[ X_3 \] = Cost of manures (Rs. /ha)


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\[ X_4 = \text{Cost of planting materials (Rs. /ha)} \]
\[ X_5 = \text{Cost of fertilizers (Rs. /ha)} \]
\[ X_6 = \text{Cost of plant protection chemicals (Rs. /ha)} \]
\[ X_7 = \text{Irrigation charges (Rs. /ha)} \]

\[ a = \text{Intercept} \]
\[ b_1, b_2, \ldots b_7 = \text{Regression co-efficient (output elasticity of respective inputs (X_i’s))} \]
\[ e = \text{Error term with usual assumptions} \]

**3.4.5 Marketing analysis**

**3.4.5.1 Price spread**

The producer’s share, marketing costs and margins of middleman in marketing of onion worked out by using the formulas given by Acharya and Agarwal (2003).

(I) **Producer’s share in consumer’s rupee (%)**

\[
\frac{PF}{PC} \times 100
\]

Where,

\[ PS = \text{Producer’s share in consumer’s rupee,} \]
\[ PF = \text{Net price of the produce received by the farmer, and} \]
\[ PC = \text{Price of the produce paid by the consumer.} \]

(II) **Marketing margins of middlemen**

The absolute and percentage margin of middlemen involved in marketing was estimated as under:

Absolute margin of \( i^{th} \) middleman = \( P_{Ri} - (P_{Pi} + C_{mi}) \)

Percentage margin of \( i^{th} \) middleman = \[ \frac{P_{Ri} - (P_{Pi} + C_{mi})}{P_{Ri}} \times 100 \]

Where,

\[ P_{Ri} = \text{Sale price of the} i^{th} \text{middleman,} \]
\[ P_{Pi} = \text{Purchase price of the} i^{th} \text{middleman, and} \]
\[ C_{mi} = \text{Cost incurred on marketing by the} i^{th} \text{middleman.} \]
Methodology

(III) Total cost of marketing

The total cost incurred on marketing of onion by the farmers and intermediaries involved in the process of marketing was computed as:

\[ C = C_F + C_{m1} + C_{m2} + \ldots \ldots C_{mn} \]

Where,

\[ C \] = Total cost of marketing,
\[ C_F \] = Cost incurred by the producer in marketing of onion, and
\[ C_{mn} \] = Cost incurred by the i\textsuperscript{th} middleman in marketing onion.

(IV) Modified measure of marketing efficiency

It was computed by employing the following formula suggested by Acharya and Agarwal (2003).

\[ MME = \left[ \frac{RP}{MC + MM} \right] - 1 \]

\[ RP = FP + MC + MM \]

Where,

\[ MME \] = Modified measure of marketing efficiency,
\[ RP \] = Prices paid by the consumer,
\[ MC \] = Total marketing costs,
\[ MM \] = Net marketing margins,
\[ FP \] = Prices received by the farmer.

The higher the ratio more is the marketing efficiency and vice-versa.

3.4.6 Garrett’s ranking technique

The Garrett’s ranking technique is adopted to analyse the problems faced in the production of onion and its marketing problems. The selected respondent were asked to rank the factors that have limited onion production and also the various marketing problems faced by them. The order of merit given by the respondents were converted into ranks using the following formula separately for both the production and the marketing problems.

\[ \text{Per cent position} = 100 \times \frac{(R_{ij} - 0.5)}{N_j} \]

Where,

\[ R_{ij} \] = Rank given for i\textsuperscript{th} factor (constraint) by j\textsuperscript{th} individual
\[ N_j \] = Number of factors (constraints) ranked by j\textsuperscript{th} individual
Methodology

The relative position of each rank obtained from above formula was converted into scores by referring to the table given by Garrett and Woodworth in 1969 (transmutation of orders of merit into units of amount or scores) for each factor. Scores of all individuals were added and then divided by the total number of respondents for the specific factor (constraint) attributes.

3.4.6.1 Statistical Analysis

All the responses were recorded and transferred to master sheet. The data were compiled, scored, tabulated and analyzed to give statistical treatments in such a way that they might give proper answer to the specific objective of the study. The following statistical tools were used for interpreting the data.

3.4.6.2 Frequency and percentage

Simple averages and percentages methods were extensively used to analyze the collected data.