CHAPTER-III
DATABASE AND METHODOLOGY

Introduction:

In this chapter, an effort has been made to discuss in detail the broad methodological framework which has been used to achieve the prime objective of the current study i.e., “Marketing of fruits in Chandigarh”. The chapter also brings forth the various sources from where the relevant data has been obtained to make the study more comprehensive.

Locale of the study: The study was conducted in different district of Himachal Pradesh, Punjab and Uttar Pradesh states. In Himachal Pradesh state the study was conducted in Shimla and Kinnor districts. In Punjab state the districts covered were Ferozepur and Hoshiarpur. In Uttar Pradesh state the districts covered were Unnao and Lucknow. The districts are selected purposively as these hold the important position in the production of selected fruits in respective states.

Selection of fruits: Apple, Litchi, Mango, Pomegranate, Kinnow, Papaya, Orange, Guava, Chicku, Grapes, Mousami, and Pineapple are the main fruits that are sold in Chandigarh market. The three fruits i.e. Apple, Kinnow and Mango form a major portion of the fruits being sold hence, these fruits are categorically selected for the study.

Selection of villages: In exhaustive consultation with market committee and the horticulture departments of different states, the list of villages growing fruits in different districts were prepared.

The sampled villages selected were:
1. From Shimla and Kinnor districts were Roru, Jubbal and Chango, Mebar respectively.
2. From Ferozepur and Hoshiarpur districts were Killinwali, Daultpura and Sikri, Jallowal respectively.
3. From Lucknow and Unnao districts were Malihabad, Mujasa and Asiwan, Banoni respectively.

As these were the localities from where the major chunk of fruits enter in Chandigarh’s fruit market.

Selection of farmers: Once the villages were selected, the hefty task of selecting the farmers laid ahead. We in consultation with the commission agents and market committee of Chandigarh, prepared a list of farmers who
were majorly into the production of the fruits under study. We were able to gather a list of 240 farmers who met our parameters. Out of these 240 farmers we selected 80 farmers for each crop, i.e., for Apple, Mango and Kinnow crop.

<table>
<thead>
<tr>
<th>Table 3.1</th>
<th>Classification of Fruit Growers in Selected Villages.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fruits</strong></td>
<td><strong>Selected Farmers</strong></td>
</tr>
<tr>
<td>Apple</td>
<td>80</td>
</tr>
<tr>
<td>Kinnow</td>
<td>80</td>
</tr>
<tr>
<td>Mango</td>
<td>80</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>240</td>
</tr>
</tbody>
</table>

*Source:* Field Survey, 2010-11(Apple), 2011-12 (Kinnow and Mango)

**Formation of Size-Group:** The revenue records of chosen villages were used for the information on operational size for all the farm households in the selected villages for obtaining the representative size groups for the study. The operational area thus obtained was systematically arranged in ascending order by applying the method of cube root frequency (*cum.3√FX*). Cumulative total was taken and thereafter three size groups/farm categories were obtained in a way so one-third of the total cumulative area is covered by each size group. For each crop three farm category groups were obtained. Farm size varied for each of the districts for the given crop.
Table 3.2
Classification of Farm Categories

<table>
<thead>
<tr>
<th>Crop</th>
<th>Districts</th>
<th>Farm Category</th>
<th>Area (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>Shimla</td>
<td>Small</td>
<td>0-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>5-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large</td>
<td>8 and above</td>
</tr>
<tr>
<td></td>
<td>Kinnor</td>
<td>Small</td>
<td>0-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>4-7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large</td>
<td>7 and above</td>
</tr>
<tr>
<td>Kinnow</td>
<td>Ferozepur</td>
<td>Small</td>
<td>0-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>10-18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large</td>
<td>18 and above</td>
</tr>
<tr>
<td></td>
<td>Hoshiarpur</td>
<td>Small</td>
<td>0-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>4-7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large</td>
<td>7 and above</td>
</tr>
<tr>
<td>Mango</td>
<td>Unnao</td>
<td>Small</td>
<td>0-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>3-5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large</td>
<td>5 and above</td>
</tr>
<tr>
<td></td>
<td>Lucknow</td>
<td>Small</td>
<td>0-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large</td>
<td>6 and above</td>
</tr>
</tbody>
</table>

Selection of Intermediaries: The list was obtained from the office of Market Committee, Chandigarh to prepare a list of commission agents/wholesalers and retailers, dealing with fruits. We randomly picked up a sample that included 30 commission agents/wholesalers and 30 retailers. These intermediaries were selected from the Chandigarh fruit market.

Collection of Data: To achieve the objectives of this study both primary as well as secondary data have been used. Two well-designed and pre-tested questionnaires were used for the current study. Two questionnaire were used, one was used to collect information from the farmers while the other from commission agents/wholesalers/retailers. (Appendices 1 & 2).

Secondary Data: Different issues of Statistical Abstracts and Department of Horticulture of respective states were the source for collecting the secondary data regarding total area, production, and yield of fruits in Himachal Pradesh, Punjab and Uttar Pradesh states as well as different selected districts. Market Committee of Chandigarh was the source of data regarding market arrivals and prices.

Primary Data: Producers/sellers, commission agents/wholesalers/ traders and retailers were the source of information for the primary data for the year
2010-11 (Apple) and 2011-12 (Kinnow & Mango). Primary data gathered for the purpose highlighted the family structure, operational holdings, area under fruits, per hectare yield, marketable surplus, pattern of marketing, prices, costs of marketing, marketing difficulties, etc. Pre-tested schedules through the personal interview method were used for collecting the data.

A four stage stratification scheme was adopted for the collection of primary data. At the first stage, the selection of Chandigarh market was made because it is a big fruit market of apple, mango and kinnow. At the second stage, three states i.e. Punjab, Uttar Pradesh and Himachal Pradesh were selected from where the produce arrives in Chandigarh market. Then two districts each from Punjab, Uttar Pradesh and Himachal Pradesh states, for each of the crop were sampled from the list of districts growing these crops having maximum area under the crops. From Punjab state, Ferozepur and Hoshiarpur districts were selected for Kinnow crop. From Uttar Pradesh State, Lukhnow and Unnao districts were selected for Mango crop. From Himachel Pradesh state, Shimla and Kinnor districts were selected for Apple crop. At the third stage, two villages for each crop from each of selected districts were sampled from the list of villages growing these crops having maximum area under the crop. The sampled villages for kinnow crop from Ferozepur and Hoshiarpur districts were Killanwali, Daultpura & Jallowal, Sikri respectively as 40-50 per cent area of these chosen villages was under Kinnow crop. The sampled villages for Mango crop from Lucknow and Unnao districts were Malihabad, Mujasa and Asiwan, Banoni respectively. The sampled villages for Apple crop from Shimla and Kinnor districts were Jubbal, Roru and Chango, Kalpa respectively as 50-60 per cent of area in these chosen villages was under this crop. From the selected villages, a sample of 240 farmers growing these fruits were taken. All efforts were made to collect a sample of population engaged in the production of the specified crops. At the fourth stage, a sample of 30 commission agents/traders/wholesalers and of 30 retailers were randomly drawn from the list obtained from the offices of the market committees and from other informed sources from Chandigarh market.

**Analytical Framework**

In order to achieve the objectives of the study, statistical techniques used in the analysis are as under:
Compound growth rates were calculated by using an exponential function to examine growth rates of area, production and yield of fruits both at the state level and at the district level.

**Functional Form:** \( \log Y_j = \log A + (\log B) t + u \)

Where, \( Y_j \) denotes;

- \( Y_1 \) = Area under fruits during the \( t^{th} \) year.
- \( Y_2 \) = Production of fruits during the \( t^{th} \) year.
- \( Y_3 \) = Yield of fruits during \( t^{th} \) year.

\( t = \text{time} \)

\( u = \text{error term.} \)

\[ \text{C.G.R.} = \left[ \text{antilog} \left( \log B \right) - 1 \right] \times 100 \]

Where, \( \text{C.G.R.} = \text{Compound Growth Rate} \)

\( \log B = \text{Regression Coefficient.} \)

To calculate the marketed surplus, from the total production of all farmers (small, medium and large) their retention (gifts, family consumption, payment to the labour, etc.) was deducted.

**Marketed Surplus = Total Production – Total Retention**

Regression analysis was applied to find out whether there exists an elastic relationship between marketed surplus and production. Several log linear equations were fitted by taking the different variables at a time and dropping the other one already taken in earlier equation. For computing the parametric values, the technique of ordinary least square method was deployed.

In absence of reliable price data over a long period, no detailed study on the arrivals and prices of fruits was possible. One of the factors which seriously handicapped price analysis was the existence of different varieties and absence of standardization. However, the available data on arrivals and average monthly prices from the period 2007-08 to 2011-12 were subjected to time series analysis by using multiplicative model:

\[ Y = T \times S \times C \times I \]

- \( Y = \text{Time series data on arrival/ prices of fruit} \)
- \( T = \text{The time trend.} \)
- \( S = \text{The seasonal variations.} \)
- \( C = \text{The Cyclical variations.} \)
- \( I = \text{The irregular variations.} \)
Firstly, the trend and cyclical variations were removed by dividing the actual value of arrival/price data of each month by the corresponding centered 12-month moving average and quotients were listed as ‘Percentages of Centered Moving Average’. This is presented by:

\[
\frac{T \times S \times C \times I}{T \times C} = S \times I
\]

By averaging these percentages using median for each month, the irregular factors were cancelled and the average itself reflected the seasonal influence alone. Hence the equation is:

\[
\frac{S \times I}{I} = S
\]

Here S is Seasonal Index.

The steps involved in the construction of seasonal index by this method are as follows:

(i) Firstly, a series of 12-months moving totals is generated.
(ii) Then a series of 12-months moving average is generated.
(iii) Then a series of 2-months moving total is formed.
(iv) In next step centered 12-month moving averages are calculated.
(v) The next step involves the calculation of the percentages of centered 12-month moving averages. These percentages are calculated by dividing the original arrival/price data by centered 12-month moving average and multiplying the value by 100.
(vi) The percentage of centered 12-month moving averages are then arranged in month-wise form. Median is used to average the figures given for the individual months, because it is not affected by extreme values.
(vii) The sum of 12 values so obtained is adjusted in such a way that their total becomes 1200. This adjustment is done by multiplying the median value of each month by a correction factor (K). The correction factor (K) is worked out as follows:

\[
K = \frac{1200}{S}
\]
Where $K$ is correction factor and $S$ is sum of median values for 12 months. The final result thus obtained gives the seasonal index.

Correlation coefficients were also computed to verify the negative relationship between month-wise price and arrivals of fruit crops for the period 2007-08 to 2011-12.

Marketing margins, cost and price spread were calculated using the mode method. The marketing margins were calculated during peak marketing periods of fruits for the year 2010-11 (apple) and 2011-12 (kinnow and mango). The difference between price paid and price received by a particular agency in the marketing sequence is the marketing margins at purchaser’s price. The percentage margins for a product at producer’s prices were computed as the ratio of the difference of the purchaser’s and producer’s prices to the producer’s prices multiplied by hundred (Bawa and Gupta 1967).

\[
\text{Percentage margins at producer’s price} = \frac{\text{Consumer price} - \text{Producer price}}{\text{Producer Price}} \times 100
\]

Producer’s share in consumer’s rupee is calculated by using the following formula:

\[
P_s = (P_f/P_c) \times 100
\]

$P_s$ = Producer’s share in consumer’s rupee.

$P_f$ = Net Price of produce received by producer/farmer.

$P_c$ = Price of produce paid by consumer.

Other statistical techniques such as averages, percentages, etc. were used for the analysis of the primary as well as the secondary data.

**Summing-up**

To achieve the objectives of the study, data from both the primary and the secondary sources were obtained. The secondary data regarding total area, production and yield of fruits, arrivals and average wholesale prices were procured from various government offices/departments, research journals and market committee, etc.

However, the primary data for the years 2010-11 (Apple) and 2011-12 (Kinnow and Mango) were collected from producers, commission agents/wholesalers, pre-harvest contractors and retailers with the help of two specially designed questionnaires. Appropriate statistical techniques/tools, i.e., time series analysis, regression analysis, correlation
analysis, percentages and averages, etc. were applied to analyze the collected data.

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